amateur radio

Vol. 37, No. 5

MAY, 1969

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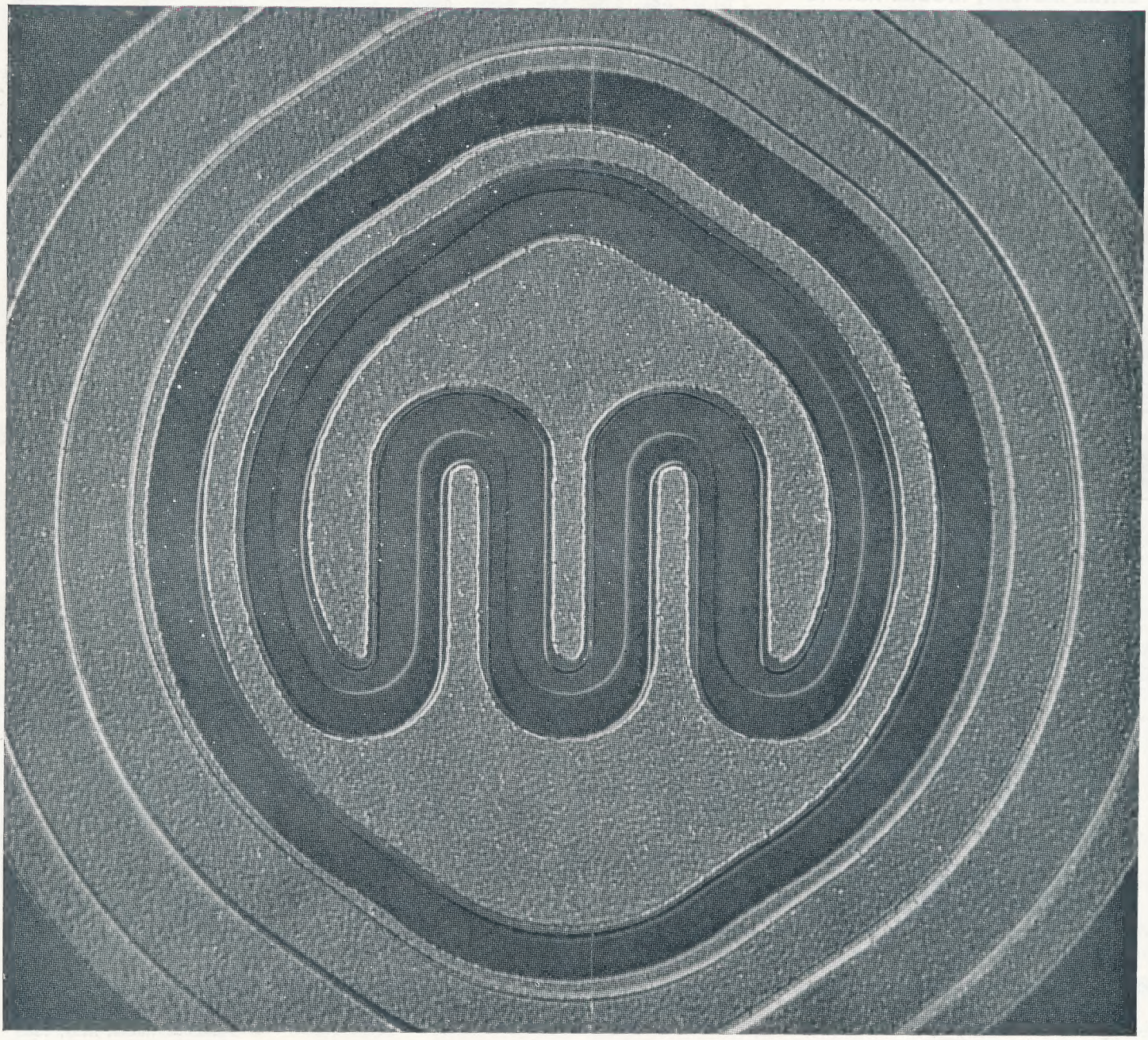

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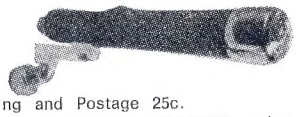

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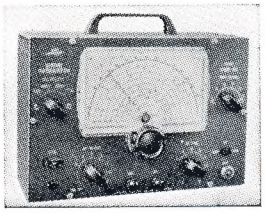

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amateur radio

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COVER STORY

Our front cover this month shows a highly magnified cut-away of the Fairchild "Planar" process. Patented the world over by Fairchild, the "Planar" process is significant in that all diffusions are made under layers of pure silicon dioxide, so that critical junctions are never exposed to the risk of atmospheric contamination. As a result, all characteristics which are sensitive to surface conditions—reverse leakage current, breakdown voltage, noise immunity, current gain, etc.—are vastly improved.

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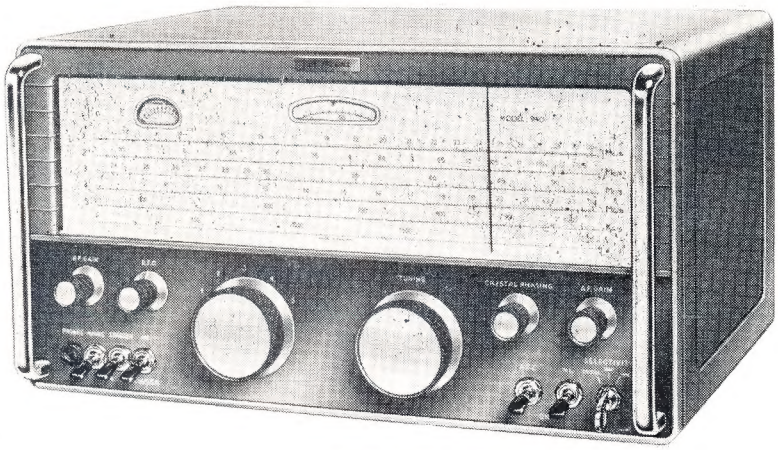

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- **Gear-driven slow motion drive and vernier scale.**
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- **Push-pull audio output stage.**

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VHF COMMUNICATIONS, the International Edition, printed in English, of the well established German Publication UKW-BERICHTE, is an Amateur Radio magazine catering especially for the VHF, UHF and Microwave enthusiast.

VHF COMMUNICATIONS will follow the same path as UKW-BERICHTE, by specialising in the publication of exact and extensive assembly instructions for VHF, UHF and Microwave transmitters, receivers, converters, transceivers, antennas, measuring equipment and accessories, which can be easily duplicated. The latest advances in semiconductors, printed circuits and electronic technology are described in great detail. For most articles, all the special components required for the assembly of the described equipment, such as epoxy printed circuit boards, trimmers, coil formers, as well as metal parts and complete kits will be available from the Australasian Representative.

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ZEITSCHRIFT FÜR DEN VHF-UHF-AMATEUR ULTRAKURZWELLEN- UND DEZIMETERWELLENTECHNIK

Mullard Special Quality Valves

for Industrial Applications

This chart enables you to identify at a glance the Mullard Special Quality Valve equivalents of C.V. Services Types, American Types and Mullard Standard Types. In addition abridged data is provided to assist in the selection of the Special Quality Valve most suited to your specific circuit requirements. Further information is available on request.

SPECIAL QUALITY PRODUCTION			DESCRIPTION	STANDARD PRODUCTION		
Mullard Type Number	Services Type Number	American Type Number		Mullard Type Number	Services Type Number	American Type Number
E55L	CV5808	8233	High slope wideband output pentode	—	—	—
E80CC	CV5989	6085	Double triode for industrial use	—	—	—
E80CF	—	7643	Triode pentode with separate cathodes	ECF80	CV5215	6BL8
E80F	CV2729	6084	Voltage amplifying pentode	—	—	—
E80L	—	6227	Output pentode	—	—	—
E81L	—	6686	Output pentode	—	—	—
E83F	—	6689	Voltage amplifying pentode	—	—	—
E86C	—	—	U.H.F. triode	EC86	—	6CM4
E88C	—	—	U.H.F. grounded grid triode	EC88	—	6DL4
E88CC	CV2492	6922	Double triode for use in computers and cascode circuits	ECC88	CV5358	6DJ8
E88CC/01	CV2493	—	Double triode for use in computers and cascode circuits	—	—	—
E90CC	CV5214	5920	Double triode for use in computers	—	—	—
E91H	—	6687	Dual control heptode for use as a gating valve	—	—	—
E92CC	—	—	Double triode for use in computers	—	—	—
E180CC	CV8431	7062	Double triode for use in computers	—	—	—
E180F	CV3998	6688	High slope wideband amplifying R.F. pentode	—	—	—
E182CC	CV5766	7119	Double triode for use in computers	—	—	—
E186F	—	7737	High slope wideband amplifying R.F. pentode	—	—	—
E188CC	CV5354	7308	Double triode for use as cascode amplifier	—	—	—
E280F	—	7722	High slope wideband amplifying R.F. pentode	—	—	—
E288CC	—	—	Double triode	—	—	—
E810F	CV5809	7788	High slope wideband amplifying pentode	—	—	—
EC1000	—	8254	Subminiature triode for use in measurement probes	—	—	—
ECC2000	—	—	Double triode for use as V.H.F. cascode amplifier	—	—	—
M8079	CV4025	‡6058	Double diode with separate cathodes	EB91	CV140	—
M8080	CV4058	‡6100/6C4WA	R.F. power triode	EC90	CV133	6C4
M8081	CV4031	‡6101/6J6WA	V.H.F. double triode with common cathode	ECC91	CV858	6J6
M8082	CV4063	‡6516	Output pentode	EL91	CV136	—
M8083	CV4014	‡6064	R.F. pentode with separate g3	EF91	CV138	—
M8091	CV4044	‡6443	Half-wave rectifier designed for operation at high altitudes	EY84	CV2235	—
M8096	CV4039	‡6062	V.H.F. power tetrode	QV03–12	CV2129	5763
M8097	CV4059	—	Low impedance diode with medium μ triode	EAC91	CV137	—
M8099	CV4070	—	Triode for use as grounded grid amplifier	EC91	CV417	—
M8100	CV4010	‡5654/6AK5W/6096	Low noise, R.F. pentode	EF95	CV850	6AK5
M8136	CV4003	‡6189/12AU7WA	Low μ double triode	ECC82	CV491	12AU7
M8137	CV4004	‡6057	High μ double triode	ECC83	CV492	12AX7
M8161	CV4015	‡6065	Variable μ R.F. pentode	EF92	CV131	—
M8162	CV4024	‡12AT7WA	Medium μ double triode	ECC81	CV455	12AT7
M8195	CV4085	—	Low microphony, low hum A.F. voltage amplifying pentode	EF86	CV2901	—
M8196	CV4011	‡5725/6AS6W	Dual control pentode	6AS6	CV2522	6AS6
M8212	CV4007	‡5726/6AL5W/6097	Double diode with separate cathodes	6AL5	CV283	6AL5
M8248	CV5311	‡6J4WA	U.H.F. grounded grid triode	EC98	—	‡6J4

‡The American types shown in this chart have the same electrical characteristics as the appropriate Mullard Special Quality type and they may, in general, be regarded as interchangeable. In the case of those types marked ‡ there are, however, certain differences in the test specifications.

Mullard

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- NUVISTOR FRONT END
- TRIPLE CONVERSION RECEIVER
- NOISE LIMITER
- A.C.-D.C. OPERATION
- INBUILT POWER SUPPLY

SPECIFICATIONS:

RECEIVER

Frequency Range:	144-148 Mc AM
Sensitivity:	1 microvolt for 10dB S/N at 145.5 Mc (0.05 W Audio Output)
Image Ratio:	50 dB at 145.5 Mc
IF Frequency:	1st IF 44-45 Mc 2nd IF 10.7 Mc 3rd IF 455 Kc
Noise Limiting:	Automatic
Squelch:	1 microV-300 microV.
Selectivity:	20 dB down at 10Kc
Audio Output:	3W 8 ohms
Input Impedance:	50 ohms (Unbalanced)

TRANSMITTER

Frequency Range:	144-148 Mc AM
Power Input to Final:	22 to 26 Watts
RF Output Power:	10W 144-146 Mc AC 240V Operation 9W 144-146 Mc DC 12.8V Operation
Crystal Type:	FT-243
Crystal Frequency:	8-8.222 Mc
VFO Frequency:	8-8.222 Mc
Microphone Input:	High Impedance w/Push to Talk
Frequency Response:	—3 dB at 300 and 3,000 c/s
Output Impedance:	50-100 ohms w/Coaxial Connector

POWER SUPPLY

AC Operation:	117/230V 60/50 c/s Receive Power Drain 106 VA Transmit Power Drain 146 VA
DC Operation:	DC 12.8V (12/14V) Receive Power Drain 90 VA Transmit Power Drain 120 VA
Tubes and Transistors used:	16 Tubes 1 Nuvistor, 8 Diodes, 4 Power Transistors
Dimensions:	H: 6⅝"; W: 11⅞"; D: 12¾"
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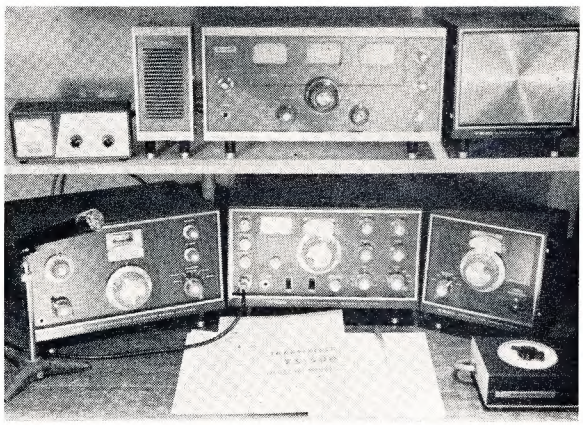

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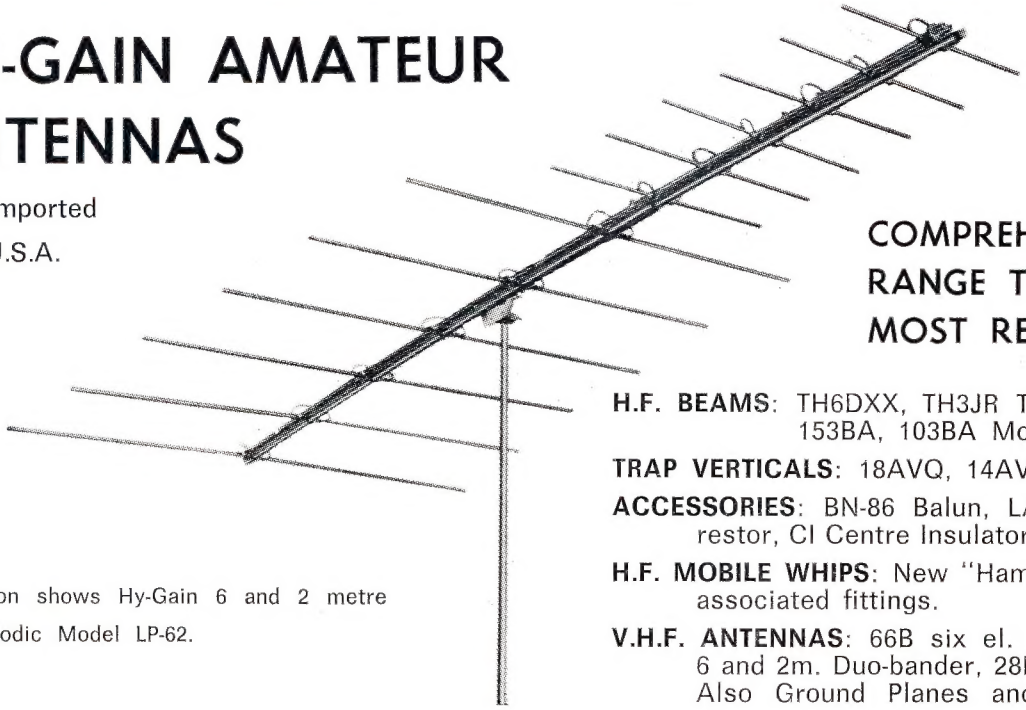

Illustration shows Hy-Gain 6 and 2 metre Log Periodic Model LP-62.

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FEDERAL COMMENT

By JOHN B. BATTRICK, VK3OR, Immediate Past Federal President, W.I.A.

I wrote this "comment" after returning from the 33rd Annual Federal Convention held last month in Canberra. This will be my last comment as I have asked Federal Council to accept my retirement from Executive due to pressure of business and for personal reasons. I announced this fact at the commencement of proceedings at the Convention, which left Federal Council the additional problem of a replacement for the office of Federal President.

However, it did allow for discussion among Federal Councillors and towards the end of the Convention, Federal Council, by unanimous decision, appointed David Wardlaw (VK3ADW) to fill the vacant position on Executive, Michael Owen (VK3KI) to the position of Federal President, and David Rankin (VK3QV) to the position of Federal Vice-President. I was appointed for a further term as the W.I.A. Director I.A.R.U. Region III. Association—for which I am grateful as it will allow me to continue to serve W.I.A. and Amateur Radio in an important area of activity, but without the stress attaching to the office of W.I.A. Federal President.

Personally I am very pleased with the decisions of Federal Council to appoint two such young and experienced men to the positions of President and Vice-President. This is, in any organisation, a rare combination—youth and experience. David VK3QV is well known as a long-standing member of Executive. His activities on v.h.f. bands and 10 metres, his competent management of W.I.A. Federal Activities (contests, etc.), his valuable assistance given to set up the Region III. inaugural congress, his contact with overseas Amateur Societies on a personal basis, his attendance at many Federal Conventions—all bring a valuable background of experience to his office. He will continue his work as Federal Activities officer in his new position.

The new Federal President, Michael VK3KI, is also a well known worker for Amateur Radio and the W.I.A. Over the past six or seven years he has been a tireless and determined officer in both Divisional and Federal matters. I say determined only because there are times when the pressing of matters clearly aimed at improving the W.I.A. organisation and our hobby has needed a forthright approach to the problems. This has been supplied and such things as the new Handbook, with its liberal operating and licensing provisions, the detailed work on the new Federal Constitution, the development and planning of the W.I.C.E.N. network in VK3, the detailed drafting of the interim constitution for the Region III. I.A.R.U. Association, the active attendance at many Federal Conventions, the recent achievements with regard to v.h.f. repeater/translators, show the results of his energetic and forthright approach.

JOHN B. BATTRICK, VK3OR,
Immediate Past Federal President, W.I.A.

A very high degree of personal rapport has been established between the officers of P.M.G. Central Office and our new Federal President over recent years. He still finds time to operate his r.t.t.y. equipment and to be active on v.h.f. f.m. nets (he was as a matter of interest, one of the first to operate equipment on 145.854 Mc. f.m., from which has grown the present net frequency system).

I put these points before you to indicate that Federal Council in its unanimous decision to appoint Michael and David to these high positions in our society recognises, no doubt, the value of youth when allied to such a wide and deep experience. Such people are rare and their expertise a "must" in any organisation. They will be ably supported by Peter Williams (VK3IZ) as Federal Secretary—also a long-standing co-worker with Michael and David, and a tireless administrator (or we hope he is tireless, hi). This point I may pick up—we all accept hard work, we all give our time as we can to help the W.I.A.—but stress none of us needs in this busy world of today.

The recent "Federal" Convention in Canberra was one of the most significant for many years. The fact that all the delegates and members of Executive present were housed together in the one centre which also contained the conference room allowed for many free exchanges of views both at the conference table and in the periods between formal sessions. As a result, many differences of opinion were explored, compromise reached, and stress reduced.

These areas in which compromise can be reached, that is, where some solution acceptable to all is possible from an initial position of difference, is one of the easiest areas for Executive to carry out. Easiest because the instructions stem from unanimity. However, many areas in which F.E. is required to execute some direction from Federal Council are less easy because instructions stem from majority decisions. Executive must, by virtue of our society procedures and rules, in these areas, proceed in a manner consistent with the views of the majority, however keeping also in mind the views of a minority. A deeper realisation of the difficulties inherent in this latter activity have resulted from the first convention in our "Federal Capital".

I hope you will all give your new Executive your wholehearted support during its coming year—I believe you have a vigorous and talented Executive with youthful and experienced leaders. As I said before, a rare combination. They have much to do for you (61 motions and motions arising were dealt with at the Canberra Convention between midday Friday and midnight Sunday). I commend them to you and thank them for carrying on from where I unfortunately had to leave off.

NEW IDEAS ON AMATEUR TELEVISION

PART TWO

GRAHAME WILSON, VK2ZGW/T*

As you have probably realised by now, Amateur Television offers a unique and challenging opportunity for the Amateur to try out his ingenuity, but there is a definite method of tackling Amateur Television so as to avoid as many problems as possible.

Firstly, if possible, you should join an ATV group or contact people involved in ATV so as to gain as much experience as possible. Many Amateurs have had experience in television and can give you a great deal of assistance.

Secondly, Amateur Television is quite different from Amateur Radio and so is the test equipment used. It is most essential that you have access to certain pieces of test equipment or you will be working in the dark—remember, television works on pulses, not on sine waves. Once again, group effort in pooling test equipment is about the best method. The most important piece of test equipment is the c.r.o., followed closely by the multimeter and signal generator.

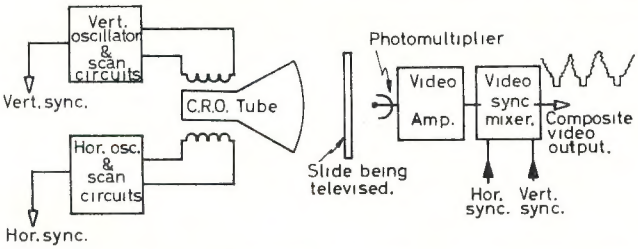


FIG. 1. THE FLYING SPOT SCANNER. (Simplified block diagram)

Thirdly, you should plan your projects well ahead of construction, show your circuit diagrams to other ATVers for constructive criticism. Basic individual circuits should be built as prototypes and their performances noted before you build any major projects as this will avoid those nagging faults that always seem to follow a bad design. I will be giving you further hints on design later in the series.

The circuits used in television, or for that matter, any electronic circuitry, are built up of basic circuit functions and if you understand these functions you will not be restricted to one design but may modify it to your own needs. It is, therefore, necessary to get your basic television circuit theory off pat.

Fourthly, do not rush in to ATV and expect results immediately, start slowly and build up your equipment, such that each section is of known reliability and when connected to the "system" you know that it will work. This is a much better approach in the long run.

Throughout this series of articles my approach to the subject will be of more to giving information and ideas rather than describing projects that follow a rather rigid line of circuitry and construction. There are several reasons for this. Firstly, it would mean a great deal of developmental work on my part to produce designs that everyone can construct without difficulty, and secondly the requirements of different Amateurs will vary greatly according to their needs and the parts they have available.

If you would like to follow a series of articles on construction of ATV equipment try and obtain copies of "A.R." March to November 1958. This series of articles was magnificently developed by E. Cornelius, VK6EC/T, and the equipment described is quite suitable for use today as it was designed around C.C.I.R. standards that the television services comply with. Considering the time the series was written it would probably be safe to say that the articles would class as one of the "classics" of "Amateur Radio," the work put into this series must have been phenomenal. All I can say is if you can get hold of the series, read it!

As this article is the second in the series I will not have time to describe the "set up" in the shack fully, but I will endeavour to give you a brief idea of what the actual equipment in the shack consists of.

The ATV station consists of three major sections:

(1) The camera.
(2) The modulator and transmitter.
(3) The converter and receiver.

Taking the last first, the receiving section of an ATV station consists of a receiving device (antenna), a 432 Mc. converter and a television set. The antenna will usually be a Yagi with about 12 to 16 db. gain, or a phased array of similar gain. The converter will vary, depending on gain needed, location and the like. For just reasonable distances, almost any reasonably low-noised converter will do, it can also have a free-running oscillator as stability for television reception is not of paramount importance. The output of the converter can feed into an unused t.v. channel[1] of a standard television set.

The camera can be of two catagories:

(1) Still camera.
(2) Live camera.

The difference between the two is quite self-explanatory. In the still camera photographs (negatives and transparencies) can be televised. The still camera consists of what is known as a flying spot scanner, this is a simple device in which a c.r.o. tube is scanned so as to produce a raster. The light from this raster is then focused through a film negative onto a photomultiplier which picks up the signal and amplifies it. Synchronising pulses from the oscillators in the scanning coils are added to the output of the photomultiplier so as the video is synchronised (known as composite video).

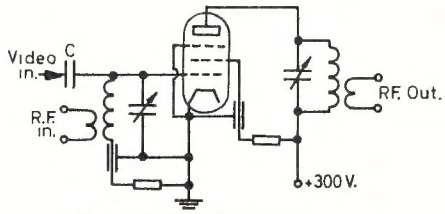


FIG. 2a. GRID MODULATION.

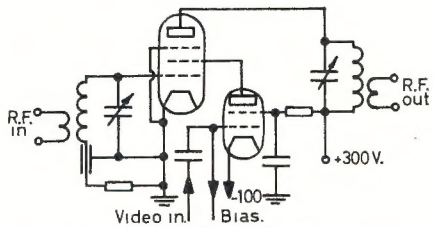


FIG. 2b. SCREEN MODULATION.

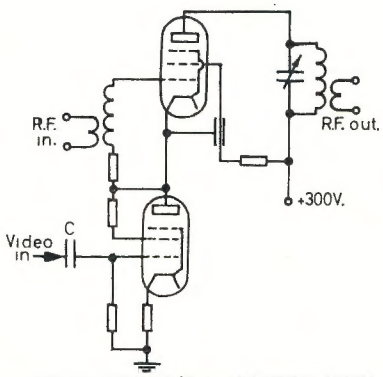


FIG. 2c. SERIES (Cascode) MODULATION.

"C" - Very large.

Note - These circuits are illustrative only.

I will describe the operation of the live camera in my next article.

The next and last section of the ATV station is the transmitter and modulator. In many respects a video transmitter is the same as an audio one, the main difference being the bandwidth of the transmitter. In order to obtain bandwidths in the order of about 5 Mc., a different approach to modulating has to be taken, the use of reactive transformers is out and one has to adopt a completely different method. This is quite easily done by coupling

(Continued on Page 15)

* 31 Ada Street, Katoomba, N.S.W., 2780.

1 Local oscillator of t.v. set should not produce harmonics on 432 Mc. if you select the channel with this in mind.

A FIELD-DAY TRANSMITTER

T. MITCHELL, VK3EZ (Ex VK5TH)*

● This article is intended to encourage building for and participating in the National Field Day Contest. The transmitter has been proved in service as reliable communications with Eastern U.S.A., Canada and New Zealand have been successful.

THIS description of a self-contained 40 and 80 metre transmitter is intended to encourage some of our younger Amateurs to take an interest in portable operations and, in particular, to participate in Field Day Contests. As VK5TH/P and VK3EZ/P, I have enjoyed several Field Day Contests, starting with unsophisticated rigs, but year by year improving my gear.

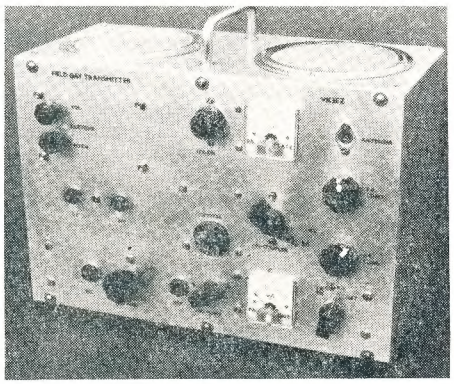
In 1968 I used the transmitter described here in conjunction with a Super Pro receiver using dry batteries, for high tension. For the 1969 Contest I was in the field using this transmitter in conjunction with an Eddystone EC10 (transistorised) communications receiver. Voltage for the transmitter was obtained from the automobile cigarette lighter via a special plug which is available for about 60 cents.

Whatever the rig, crude or sophisticated, the John Moyle Memorial National Field Day Contest is, for me, the most important day in the Amateur Calendar. There is no more enjoyable experience than operating under field conditions, using equipment built, modified or improvised for the occasion.

* 91 Roslyn Street, Burwood, Vic., 3125.

In designing this 15-watt transmitter, my original intention was to build a transceiver. The space now occupied by the power supply and sidetone amplifier was to be used for a two-band transistorised receiver. Terminal TSB-3 was the receiver 12 volt supply. Having bought the EC10 receiver, the inducement to continue the in-built receiver ceased.

Some points of interest are:



1. **Portability and Cost**

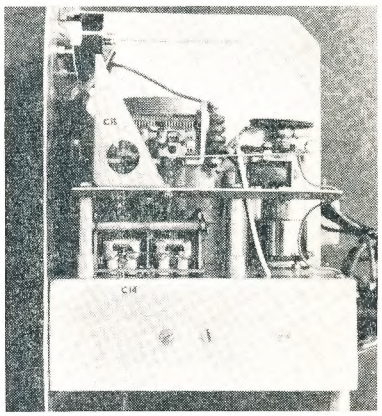
The cabinet, sidetone speaker, C14, C15, TR/1 and several other components were purchased quite cheaply from city disposal houses.

2. **Single Switch Operation**

See circuit diagram and note the separate meters for monitoring power amplifier grid and plate current. The space taken by a small meter is no larger than necessary to accommodate a switch, and having separate meters means less inter-circuit wiring. No microphone press-to-talk switch is necessary.

3. **Keying**

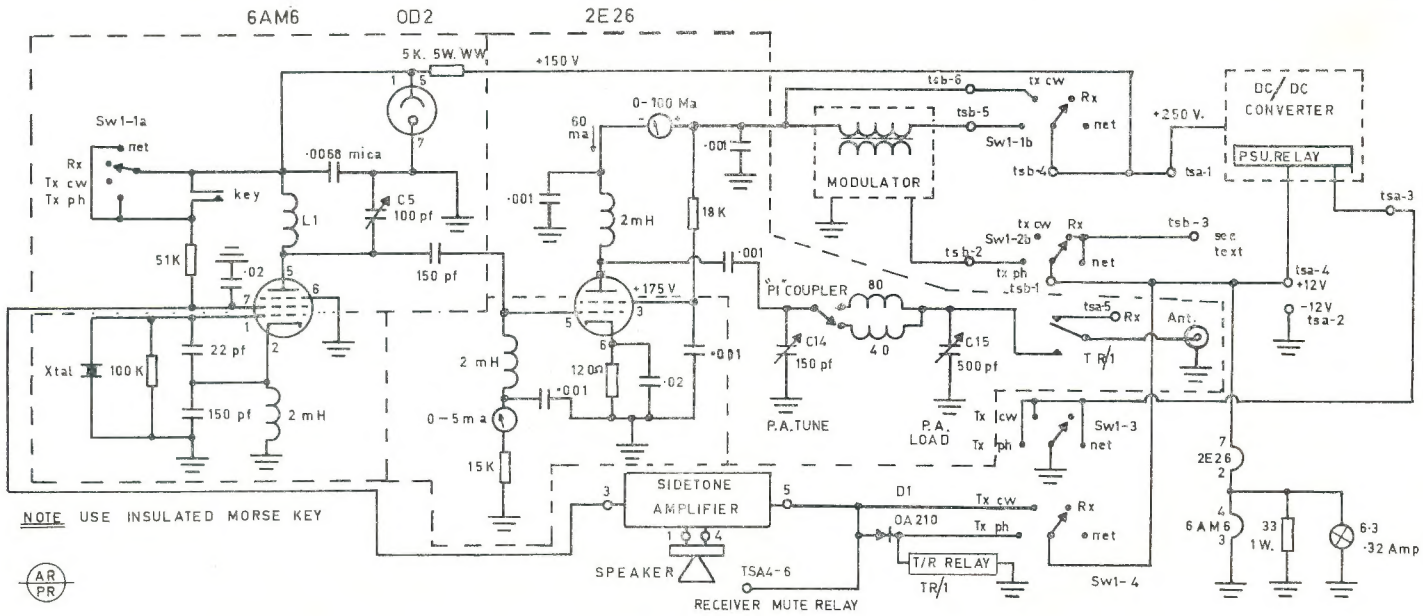
Screen grid keying is quite effective in this transmitter. In conjunction with crystal control and a regulated h.t. oscillator supply, and noting the very small keyed screen grid current (0.7 mA.), the transmitter output is clean, chirpless and free of key clicks. The disadvantage, of course, is that the



Morse key is at +150 volts potential. However, insulated keys are available at disposals houses at about 50 cents.

4. **C.W. Monitor (Sidetone)**

As a keen c.w. operator, I insist on a keying monitor. I do not like using a transistorised receiver for monitoring signals. It is far better to switch off the receiver whilst transmitting. Most



FIELD DAY TRANSMITTER

circuits previously published have used r.f. power as a voltage source for the monitor. However, I consider that with the low r.f. power available, adjustment of coupling could be tricky.

My circuit uses the oscillator keyed screen supply as a voltage source for the multivibrator transistors in the sidetone unit. Although this does not prove that the transmitter is actually radiating, it provides a faithful reproduction of the operator's keying characteristics. The 12-volt supply is used for the sidetone output circuit: Diode D1 prevents sidetone operation when switched to "transmit phone".

5. **Stability**

With crystal control, regulated high tension supply for the oscillator, and proper screening, stability is as good as many fixed station transmitters. The broken lines on the circuit diagram in conjunction with the photographs show clearly the screening. Note that the oscillator tube is mounted above the chassis to provide further isolation between oscillator plate and grid circuits.

6. **Minimum Operating Controls**

Careful consideration was given to this aspect and the circuitry provides single switch operation for four functions. The oscillator plate circuit tuning capacitor C5 tunes 40 metres at near minimum and 80 metres at near maximum. 80 or 40 metre crystals can be used for 40 metre operation. The EF91 (6AM6) is a well screened tube and operation on the fundamental crystal frequency is satisfactory.

7. **Phone Operation**

The modulator is based on an article entitled "Modulator Design with OC26 Transistors" in Mullard "Outlook" for May-June 1960, modified in the March-April 1962 edition.

8. **Coil Data**

Oscillator plate coil L1—

25 turns of 30 gauge enamelled wire on a 1" diameter former, turns removed to tune 80 and 40 metres at near extremities of C5.

80 metre final tank coil—

21 turns of 24 gauge wire on a 1½" diameter former, double spaced.

40 metre final tank coil—

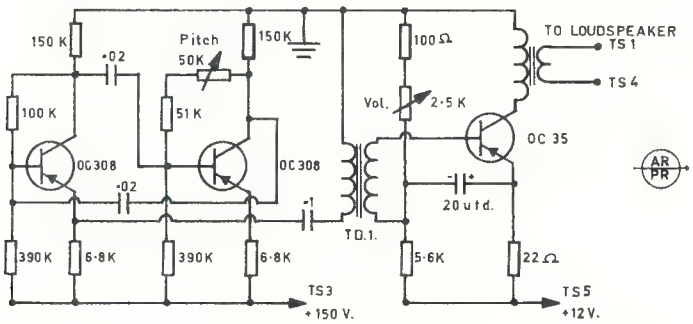
13 turns of 24 gauge wire on the same 1½" diameter former, double spaced.

GETTING LAST BIT OF POWER FROM A.W.A. MR3 CARPHONE

If you measure the voltage drop across the metering resistor in the p.a. anode of your MR3 (and I suppose other units also) you will find a drop of about 8 volts across this 100 ohm resistor which means that about ½ watt is being dissipated as heat.

So to make this ½ watt of power work, short out this resistor by applying a short to your metering plug and leave it plugged permanently into the p.a. anode metering socket.

—Max Hepner, VK3ZQY.



SIDETONE OSCILLATOR AND AMPLIFIER

1969 U.S.S.R. DX CONTEST

RULES FOR C.W. SECTION

Date: 09 GMT, May 3, to 21 GMT, May 4.

Object: To work as many stations as possible, both in the U.S.S.R. and in other countries.

Exchange: RST plus three-figure serial number starting from 001.

Scoring: Each contact is worth 3 points. Contacts with the same country count 0 points, but can be counted as a multiplier. The multiplier will be equal to the total number of countries worked, regardless of the band. Final score equals sum of QSO points from all bands multiplied by number of countries worked.

Scoring will be for a maximum of 12 hours. Submit the complete log, but mark the 12-hour period you wish to be entered for and score only this period. Mail the log within 15 days to C.R.C., P.O. Box 88, Moscow D-362, U.S.S.R.

YL INTERNATIONAL S.S.B'ERS 1969 QSO PARTY

Beginning 0000 GMT, 24th May, through 2400 GMT, 25th May, 1969, both phone and c.w. S.s.b'ers have many c.w. only members so all bands and modes will be used and a new c.w. only plaque will be awarded for world high c.w. score. The QSO Party is in three categories, non members are welcome as all Radio Amateur awards are supported.

Categories: 1—DX/WK teams, 2—YL/OM teams, 3—single operator.

Exchange: RST, s.s.b. number, state, country, or VE/VO province, partner's call. If no partner, leave blank. If non-member, send "no number". Sending name is optional.

Suggested Frequencies: Plus or minus 5, 10, 15 Kc. as QRM dictates. Phone—3873, 7273, 14332, 21373. DX may transmit on 3773, 7090, 1433. C.w.—3565, 7065, 14070, 21070, 28070.

DX/WK Teams: Each team consists of a DX and a WK station. The team score is the sum of both partners' scores and determined when both logs are received.

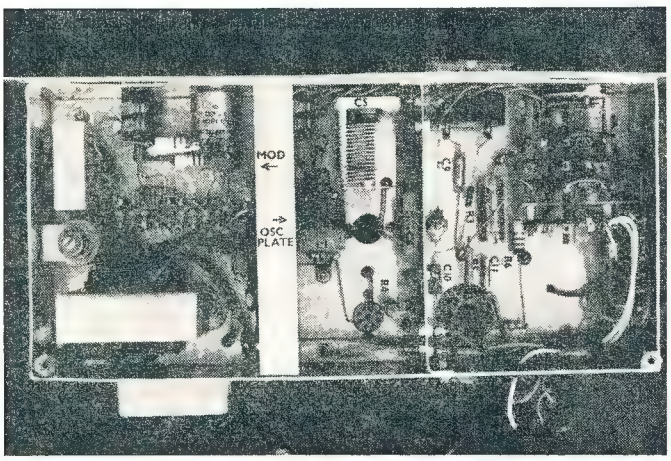
YL/OM teams: Each team consists of one YL member and one OM member who are related, i.e. husband and wife, father-daughter, mother-son, brother-sister. Operation must be from same QTH using same rig and his or her own call.

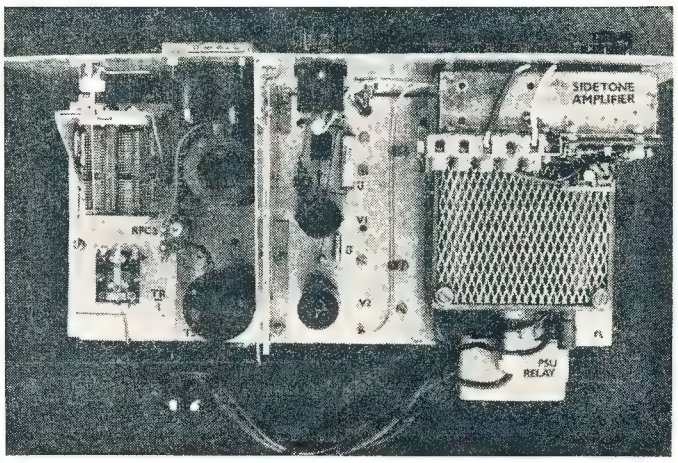
Single operator category: Non members will be entered in this category.

Logs: Must show GMT date, GMT time, RST sent and received; his state, VE/VO province, or country; s.s.b'ers number, partner's call, bands and modes of operation. Logs must show six continuous hours of rest in each 24-hour operation and each team member must show at least six hours of operation during the party. To qualify for the single operator world-high combined score trophy, logs must show at least six hours of operation in each mode, c.w. and s.s.b.

Conditions: The same stations may be contacted for additional contact points on different bands and modes, but NOT for additional multipliers. All operations will be with one transmitter and receiver or one transceiver and receiver only. Any difficulty not covered by these QSO Party rules will be decided by the YL Int'l SSB'ers Executive Council for maximum pleasure to all participants.

Logs go to Woody Bennett, W0GNX, 8939 E, 31st Street, Kansas City, Missouri, 64129, U.S.A.





PROJECT—SOLID STATE TRANSCEIVER

PART SEVEN

H. L. HEPBURN, VK3AFQ, and K. C. NISBET,† VK3AKK*

THIS month's article will deal with the cabinet for the complete transceiver and give an abridged lining up method for the receiver. It was originally intended to describe the transmitter p.a. in this article but—to judge from correspondence—the majority of participants preferred to have cabinet and receiver line-up information first. The p.a. article will thus appear next month.

THE CABINET

An exploded view of the cabinet is given in Fig. 21, from which it can be seen that it consists basically of a "U" shaped chassis tray to which back and front panels are attached. Unperforated top and bottom covers, slightly wider than the depth of the cabinet, follow the rounded corners of the panels and attach to the vertical sides of the central tray.

Fig. 18 gives the front panel layout, the central item being the Eddystone Type 898 dial, with all other controls and inlet sockets being symmetrically grouped round it.

Not shown is the rear panel which carries signal and power connections for external crystal or v.f.o. control, the antenna input socket, the power input socket and provision for future vox controls.

Figs. 19 and 20 give the layout of the various printed circuit boards and die cast boxes on respectively the top and under sides of the main chassis tray.

No attempt has been made to miniaturise the case, it being felt more important that there should be plenty of working space for both the initial interwiring and subsequent adjustment procedures. A bonus to this line of reasoning is that plenty of room is available for the future addition of extra bands, converters, calibrators, vox, two-tone test oscillators and other similar accessories.

The cabinet made for the project (and mentioned later under "Availability") has a chasis tray made of 16 gauge steel, a back panel of the same gauge and a front panel of 14 gauge steel. The top and bottom covers are of 20 gauge steel. All parts are fully drilled, cadmium plated, passivated and the exterior parts sprayed.

Those who wish to make a smaller cabinet to suit their own end requirements will undoubtedly do so. It is to be hoped they may get a few ideas from these notes.

As an example of the degree of "compression" that can be achieved, it is worth mentioning that one of the authors (VK3AKK), using standard project boards and a smaller (but less satisfactory) dial, has made a three-band transceiver that fits into the glove box of his Kombi station wagon.

RECEIVER ALIGNMENT

This part of the article will make frequent reference to coils, trimmers, etc., and the reader is advised to have before him the six previous articles in this series, i.e. the November and December 1968, and the January, February, March and April issues of "A.R." The reference numbers (of coils especially) are those used in the previous articles.

It is assumed that a **good** signal generator is available to do the lining up of the receiver. By "good" is meant a s.g. with a reliable attenuator. It is not recommended that use be made of the cheaper types whose leakage alone may be in excess of tens of microvolts.

With one exception, Figs. 14 and 15 in the March 1969 issue of "A.R." gave the d.c. and signal interconnections for the modules making up the receiver part of the project. The exception was the filter pre-amplifier. When on receive this module takes its h.t. feed from the a.g.c. line through a diode, and should be so connected in carrying out the commissioning procedure.

Rather than put all modules into their final case or cabinet, it is strongly recommended that they first be mounted on to a metal plate (aluminium for preference) about 18" and 12", using the layout given in Fig. 19. The voltage regulator board, the 0-1 mA. "S" meter and the b.f.o./prod. det. box can be wired "outboard". This procedure is recommended in order to make simple the removal and checking of any individual board should this be necessary.

It is also suggested that the various switches are not wired into circuit and that connections to the desired sections of the circuit be made using temporary leads. In this way it is possible to commission one band at a time and be sure it is operational before going through the time consuming process of wiring up, say, the bandswitch, and then perhaps having to disconnect when a problem turns up somewhere.

These general remarks apply not only to the bandswitch but to functional

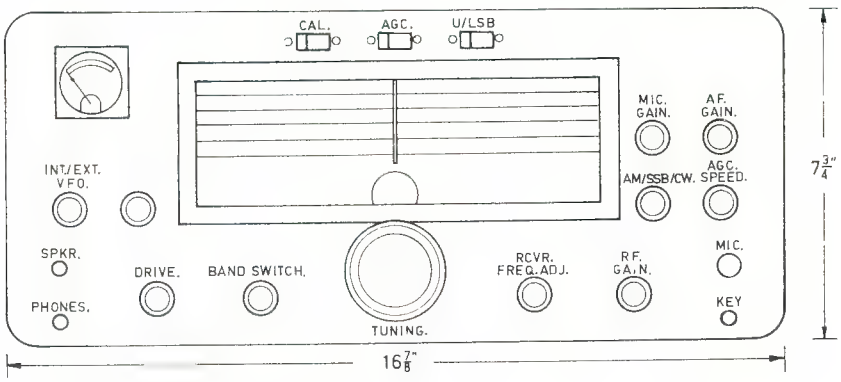


FIG. 18. FRONT PANEL LAYOUT.

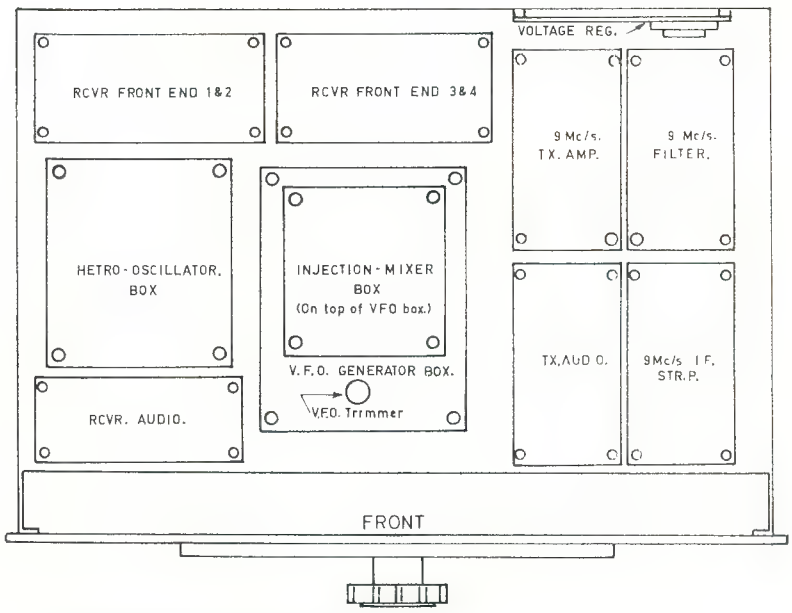


FIG. 19. ABOVE CHASSIS VIEW.

* 4 Elizabeth Street, East Brighton, Vic., 3187.
† 25 Thames Avenue, Springvale, Vic., 3171.

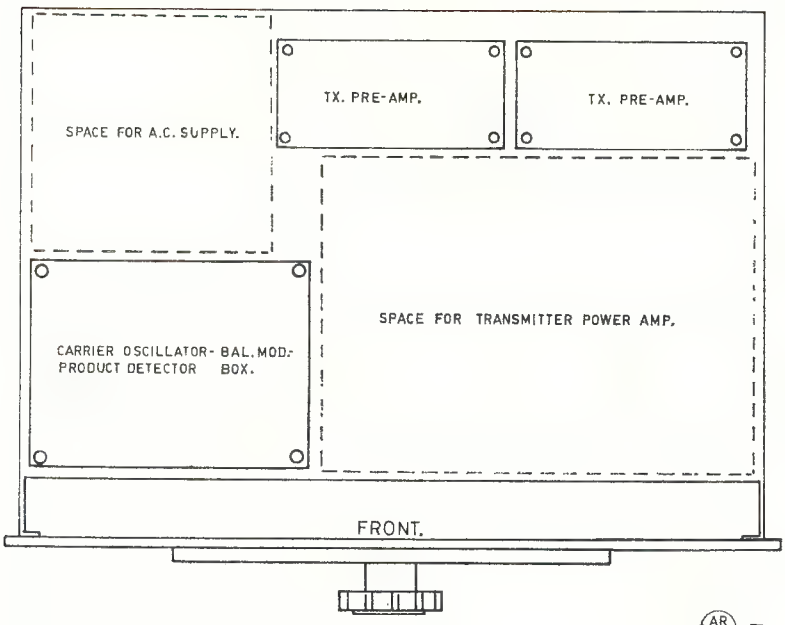


FIG. 20. UNDER CHASSIS VIEW.

switching such as a.g.c. speed, upper and lower sideband, a.m./c.w./s.s.b., etc.

To further simplify commissioning, it is recommended that no relays be used but that direct connections be made to the points on the v.r. board indicated by Fig. 14.

The general connection procedure is as follows.

(1) Receiver audio module. Take h.t. from the unregulated supply. Take input from the slider of a 50K potentiometer wired across the spare terminals of the uA719c i.c. (Fig. 14). The potentiometer can be mounted on a temporary bracket near the front of the base board.

(2) Receiver i.f. strip. Take h.t. from the unswitched regulated line on the v.r. board. Do not wire in the 320 uF. and 1,000 uF. a.g.c. timing capacitors at this time. Make the necessary connections between the a.m. (not limited) output pin, the 50K audio level control and the spare uA719c pins (Fig. 14 again). Do not wire in the a.m.-limited circuit.

(3) Connect the a.g.c. outlet on the i.f. board to the a.g.c. inlet on the v.r. board. Wire the "S" meter to the v.r. board. Set the 1.5K "S" meter zero and the 22K "S" meter f.s.d. trimpots on the v.r. board to half rotation. Set the 22K a.g.c. threshold trimpot on the i.f. board to maximum resistance to render the a.g.c. action inoperative (see Jan. '69 "A.R.").

(4) Temporarily connect a 100 ohm resistor across the i.f. board input terminals to act as a "load".

(5) From a signal generator apply 100 microvolts or so of modulated 9 Mc. to the input of the strip. Adjust the cores of T1 and T2 for maximum audio output, backing off the generator as resonance is reached. When on resonance, connect a 0-15 voltmeter between the a.g.c. line and earth. Adjust the 1.5K trimpot on the v.r. board to zero the "S" meter. Set the signal generator to 20 microvolts output and then adjust the 22K a.g.c. trimpot on the i.f. board until the voltage indicated on the 0-15 voltmeter just starts to drop. At this point the "S" meter should just start to rise.

The back end of the receiver is now nearly on frequency. Exact frequency will be established in the next step.

(6) Remove the 100 ohm resistor from the input to the i.f. board and wire in first, the filter board and then the filter preamplifier board. Use thin co-axial cable for signal connections, earthing each end of the shield to the earth pins provided on the various boards. It may be necessary to take the earth mat on the i.f. strip directly to the ground plate by means of lugs soldered to the earth mat at each corner and use the mounting bolts to complete the earth return. The h.t. feed for the filter board comes from the main regulated supply. The h.t. feed for the preamplifier comes from the a.g.c. line.

Apply a 100 microvolt modulated signal to the preamp. input. Swing the generator slowly around 9 Mc. until a signal is heard going through the pass band of the filter. Centre the signal in the pass band and adjust the cores of T3 and L23 (Fig. 10) to resonance. Repeak the cores of T1 and T2 on the i.f. board to resonance. Note that these adjustments, and those that follow, can be done using the "S" meter as a tuning indicator.

The back end of the receiver is now operative in the "a.m.-not limited" mode.

(7) **The VFO.**

To adjust the frequency of the v.f.o. to the correct range, the following procedure is recommended.

Set the main tuning capacitor to full capacity and the 3/30 pF. trimmer to half capacity. Apply power to the v.f.o. from the regulated line. Listen for the v.f.o. note between 8 and 10 Mc. on a general coverage receiver. Note this frequency. Open the tuning condenser to minimum capacity and again search for and note the frequency of the v.f.o. signal.

As the coil supplied in the kits has excess turns on it, the v.f.o. range in the unmodified condition will probably be less than 0.5 Mc. and will have a lower range frequency below 10 Mc.

Temporarily short the top turn of the v.f.o. air-wound coil and repeat the "range" measurement. The lower v.f.o. frequency will now have risen from, say, 8.5 Mc., or thereabouts, to perhaps 9.0 Mc. or thereabouts. Again short a turn and repeat the "range" measurements. Repeat this procedure until the lower v.f.o. frequency is close to 10 Mc. and can be brought exactly on to 10 Mc. by adjustment of the 3/30 pF. trimmer. Remove the shorted turns from the coil and check again that the lower v.f.o. frequency can be set to 10 Mc.

(8) The **46 Mc. oscillator** is now checked. Set the slugs of L15 and L13 (Fig. 6) to half way. Set the slug of L14 almost out. Screw L14 through its complete range and note where the drain current (as measured with a volt meter across the 1.0K decoupler, or with a 0-20 mA. meter in series with it) drops by about 0.5 mA. (indicating oscillation) and then rises again (in-

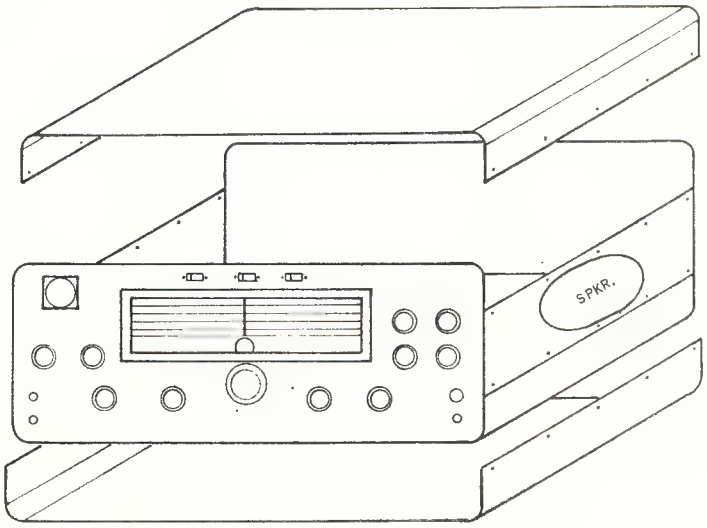


FIG. 21. EXPLODED VIEW OF CABINET.

dicating non oscillation). Set the L14 slug half way between the "oscillating" points. Check that oscillation starts reliably by switching the h.t. on and off several times. It may be necessary to repeat this procedure several times, making small adjustments to the core of L15 each time, to ensure reliable starting and oscillation.

(9) The **heterodyne oscillators.** For each band, one at a time, set the slug of L19 to mid way and the slug of L20 full out. Connect each oscillator to the regulated voltage line through a 0-10 mA. meter. Swing the slug of L20 through its full range, noting the points at which the drain current falls by about 0.5 mA. (indicating oscillation) and then rises again (indicating cessation of oscillation). Set the slug between these two points and check for reliable starting by switching h.t. on and off a few times.

(10) **Receiver front ends.** Check each front end strip separately, one band at a time.

Connect up the v.f.o./generator, the injection mixer and the appropriate heterodyne oscillator as shown in Figs. 14 and 15. The output of the injection mixer is coupled to the oscillator input of the front end board in use. Check that the 1,000 pF. capacitor across the output of the front end board is in place. (Refer to Dec. 1968 "A.R.") Connect the front end board output to the filter preamplifier, again using co-ax. H.t. feed for the front end board is taken from the a.g.c. line.

From the signal generator (set at mid band frequency) apply a 100 microvolt signal to the antenna input link (L1, Fig. 5).

Swing the v.f.o. tuning condenser until the input signal is identified. Peak the cores of L2 to L8 on the front end board, L16, L17 and L22 on the injection mixer board, and L10 and L12 in the v.f.o. for maximum output as indicated on the "S" meter, backing off the signal generator output as lining up proceeds.

The cores of the two 46 Mc. traps, L11 (v.f.o.) and L18 (inj. mix.) are set at the half way mark.

The complete receiver is now operational in the a.m. mode.

(11) The **carrier oscillator and product detector**. The carrier oscillator, or b.f.o., can be checked by applying voltage from the regulated line and listening around 9 Mc. on a general coverage receiver for output. Both "normal" and "reverse" carriers should be checked.

Feed output from the b.f.o. and the i.f. strip to the product detector. Apply a few microvolts of unmodulated signal frequency to the front end board. It should now be possible to hear an audio output. Replace the signal generator with an antenna, tune in a sideband station, and adjust the 3/30 pF. trimmer across the "normal" sideband carrier crystal to give acceptable speech quality.

This completes the primary commissioning procedure.

The various modules may now be placed in their final positions in whatever case or cabinet is to be used in the knowledge that they are all working correctly. Wire in the various external function switches and controls.

The final line-up consists simply of tweaking the various slugs to give maximum output. The cores of L3, L5 and L7 on the front end boards are adjusted to give maximum output at about 25% of the way above the lower band edge, while L2, L4 and L8 are adjusted at say 25% below the upper frequency end of the band in use.

AVAILABILITY

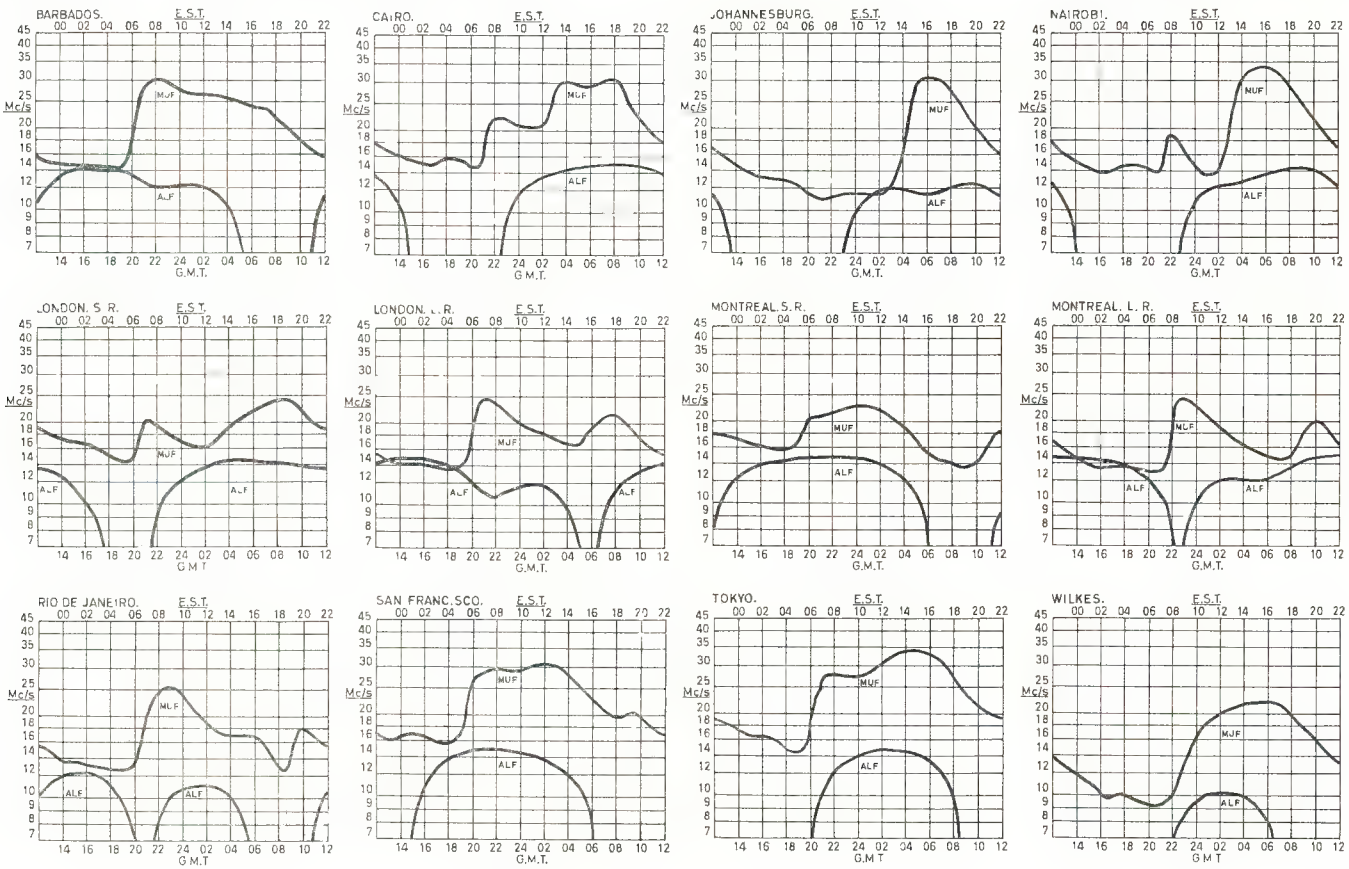
(a) Fully drilled, cadmium plated and passivated cabinets with the exterior sprayed black are $28.50 each, including packing. Supplies will be available from about the third week in May. Transport will be extra, so please include enough to cover 20 lbs. weight.

(b) Dials. The recommended Eddystone No. 898 dials are obtainable direct from Wm. Willis, of 430 Elizabeth St., Melbourne, 3000, at $22.22 each. They can be obtained through the project at the same price if required.

(c) Accessories kit. This contains all the necessary plugs, sockets, knobs, switches, etc., except the bandswitch. The standard kit—including "S" meter and two 12 volt DPCO gold plated relays costs $32.50 exclusive of postage. Relays and "S" meter are obtainable separately if required.

PREDICTION CHARTS FOR MAY 1969

(Prediction Charts by courtesy of Ionospheric Prediction Service)



THE DJ4VM MULTIBAND QUAD*

Aerial System with Two Driven Elements and Centre Fed Single Quad Loop per Element

by PROF. DR. PHIL. WERNER BOLDT,† DJ4VM

(Abstract Translation by H. F. RUCKERT,‡ VK2AOU, ex-DL1EZ)

THE advantages of a monoband cubical quad aerial, to give good DX results in spite of low installation height (<1λ) and its high front to back (F/B) ratio, are well known. Not solved is the problem of achieving these features if a conventional multiband quad with two or three wire loops per element is employed. At 28 Mc. only 25% of the 14 Mc. element area is being used. Field interaction occurs and the phase symmetry upper and lower quad half is disturbed. Recent publications[1] show that certain solutions to this problem are being tried.

The author developed a new quad, working at first at 145 Mc., and since autumn 1967 on the DX bands (German patent applied).

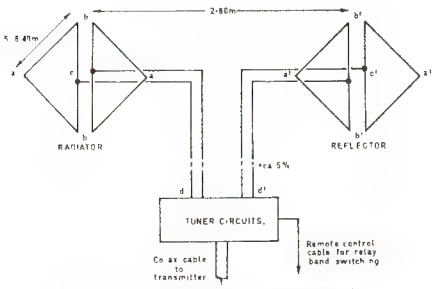


FIG 1 Schematic diagram of DJ4VM multiband quad, both elements driven

DESIGN FEATURES

Each quad element consists of two triangles and the hypotenuses are part of the feed line to drive the upper and lower element half exactly symmetrically (Fig. 1). The four sides of the quad (short sides of triangle) are 5 m. (16 ft. 3½ in.) to 6.4 m. (21 ft.) long for 14, 21 and 28 Mc. operation. The spacing between the radiator and the reflector may be 2.6 m. (8 ft. 6 in.). The reflector quad, including its tuned feeder, should have 5% more wire length or the tuning coil may be increased instead.

The feeder lines are made long enough so that the aerial tuners (one for each band, and such a set of three for each element, e.g. six tuners for a triband two element quad) can be easily reached from below the quad for tuning of the aerial at the final and high position. The feeder should not be a multiple of a quarter wave on any band, to avoid tuner adjustment difficulties. A single co-axial cable goes from the transmitter to the tuning box containing the switching relays and the tuned circuits of the aerial tuners.

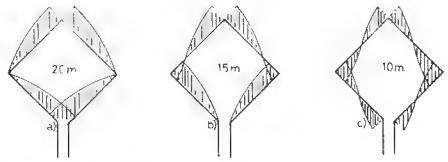


FIG 2 Current distribution of an unsymetrical fed 20 m quad element operated at 20m, 15m, & 10m. A nearly round radiation would occur at 10m.

Aerial relays may be used to switch the co-axial feeder to the desired tuner parallel tuned circuit, and to connect the parallel wire feeders of the two quad elements to the appropriate tuner pair. The relays may be remotely operated from the shack.

ADVANTAGES

This quad has less wind resistance than a conventional 2 x 3 wire loop quad. The wire length is not critical, and the four outer quad element sides may have 2.4 times the length of the shortest wavelength transmitted. Loops of 4 x 5 m. (mini quad) or over 4 x 6.5 m. (extended quad) bring reduced efficiency and additional radiation loops respectively. Separate tuning of each element at the three main operating frequencies assures low SWR and compromise free conditions.

An extremely high front to back ratio is maintained in spite of the same spacing for all three frequencies (F/B ratio is only 15 db. in the case of some other multiband quads). There is only a small frequency difference (30 Kc. at 21.3 Mc.) between tuning for the best forward gain and maximum F/B ratio. The usually necessary difficult-to-perform tuning near the top of the mast is avoided. Retuning of the elements at full operating height, after the initial tuning has been carried out near the ground, is no problem.

The accurate symmetrical tuning and feeding of the element halves guarantees clean phase conditions, causing better directivity (narrow beam of radiation), therefore more gain and extremely small backward radiation, resulting in less QRM, low vertical angle radiation (important for DX). (See Figs. 2 and 3). These advantages may be worth the effort to construct the more complex feeder-tuning system, if the operator wants no compromise but perfection.

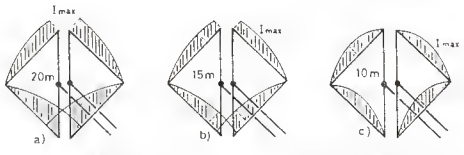


FIG 3 Symetrical current in upper and lower quad dipole system.
(a) Full size on 20m
(b) Extended quad on 15m.
(c) Bi square quad on 10m (4db extra gain.)

CONSTRUCTION DETAILS

The boom carries at each end a cross made of fibre glass or weather-treated bamboo rods. The vertical member of the cross holds the tuned feeder part of the quad element (hypotenuses of triangle) in form of a 600 ohm (or so) feed line. The two dipole wires are strung between the cross ends to form the quad loop. (Fig. 5.)

The aerial tuners have approximately the following dimensions (capacitors being 50 pF. maximum):

COIL DATA

20 mx band: 10 turns, 4 cm. (1.57 inch) diameter.
15 mx band: 8 turns, 3.5 cm. (1.38 inch) diameter.
10 mx band: 8 turns, 3 cm. (1.18 inch) diameter.

The co-axial (50 ohm) feeder line may be link coupled (via 1 to 2 turns) or connected directly 1 to 2 turns away from the earthed centre of the tuner

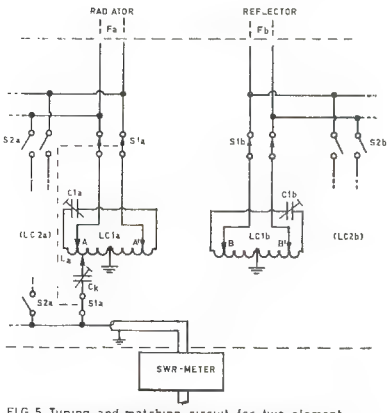


FIG. 5. Tuning and matching circuit for two element multiband quad, (two of the required six tuners are shown) with parasitic reflector.

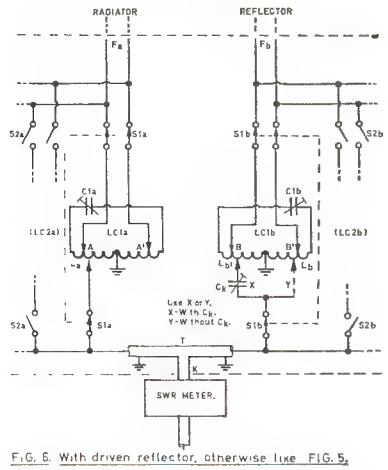


FIG. 6. With driven reflector, otherwise like FIG. 5.

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* Abstract Translation from "DL-QTC", No. 9, 1968.

† Am Zuckerberg, 4773 Koerbecke/Moehnesee, West Germany.

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coil. It is recommended to add the trimmer Ck to be able to tune out the coupling reactance in order to obtain a low SWR. It is advisable to check the tuning of C1a and C1b with a calibrated GDO, with the quad connected, but the co-axial line disconnected (at first).

If the co-axial cable connecting points have been correctly chosen (matched condition), only a slight retuning of C1a and C1b is needed after the cable has been attached.

The reflector tuning is carried out by adjusting C1b (C1a may be rechecked finally), and a testing dipole is used a few wavelengths behind the reflector and placed as high as the quad. The line between the test dipole (receiving diode) and the indicating instrument (near quad tuning box) must be r.f.-free and shielded to avoid misleading results.

Fig. 5 and Fig. 6 show a version with parasitic and one with driven reflector respectively.

The second case is shown in Fig. 6. In order to feed the radiator and reflector with r.f. of opposing phase, the co-axial line is split near the tuning units, and the leads from the switches (relays) S1a go to the left half of the coil La and S1b to the right hand side of Lb (case "Y"). The connecting points at the coils are slightly moved outwards (120 ohm) to achieve matching.

If a further improvement in the SWR is found to be necessary, the trimmer Ck (case "X") may be added (connection "Y" removed) and Ck is attached to the left side of Lb, e.g. left of the earthed centre tap. Ck and C1b are alternatively adjusted for SWR minimum.

The coil tap positions for the feeder leads from S1a and S1b (via Ck) are:—

20 mx band: 1.5 to 3 turns from the earthed centre.

15 mx band: 1 to 2 turns from the earthed centre.

10 mx band: 0.5 to 1.5 turns from the earthed centre.

The backward radiation minimum is very sharp. A SWR of less than 1:1.5 should always be obtainable at the tuning frequencies.

RESULTS

Absolute gain values are not quoted because a suitable test dipole (as high as the quad, at the right distance) was not available. The radiation pattern (Fig. 7) was obtained with the help of DJ5RH operating a high quality measuring receiver (Siemens, Type B83 600-A80) at a six miles (10 km.) distant location. The often quoted S meter readings of uncalibrated receivers are not accurate enough and often only wishful thinking.

The horizontal width of the radiated beam at the half power level amounts here to only 50° at 20 mx (75° with conventional full size quad values), 40° at 15 mx, 30° at 10 mx, and the half voltage beam width is 75° (90° with conventional full size quad values).

The narrow 20 mx beam is due to the quads' symmetry and the feeding of both elements, and the still narrower beam at 15 mx and 10 mx is the result of the extended elements (dipoles) used here.

The front to back ratio was on all the bands better than 40 db. (5 to 25 db. in some cases of multiband quads) for the version with driven reflector, and 25 db. with parasitic reflector. This ratio depends also on the (not measured) vertical radiation pattern of the aerial, e.g. the vertical angle the received signal happens to come in (propagation, position and type of the other operator's aerial).

Measurements over the 21 to 21.45 Mc. band (Fig. 8) show some interesting features, which are also true for many other beams. One finds a maximum forward gain at 21.34 Mc. and a substantial drop at 21 Mc., whilst the SWR is within 1:1.2 and 1:1.4 over the entire band with the minimum near 21.2 Mc. (not 21.34 Mc.). The F/B ratio maximum is found at 21.3 Mc. (30 Kc. below gain maximum). It is clearly demonstrated that a high gain aerial is selective and has to be tuned to the mainly preferred Amateur band section to utilise its ability to advantage.

It may be mentioned that the described quad principle can be adapted to other quad forms like triangle hypotenuses held horizontal, circular elements, Swiss (HB9CV) quad, etc., At v.h.f. it was noticed that a 50% increase of the loop circumference caused a marked gain increase. It may be possible to replace the three separate tuning units per element by one multiband tuned circuit (a la VK2AOU).

The author expresses his sincere thanks to Om Karl-Heinz Krah, DJ5RH, for the help during the aerial construction work and the assistance given during the many measuring runs.

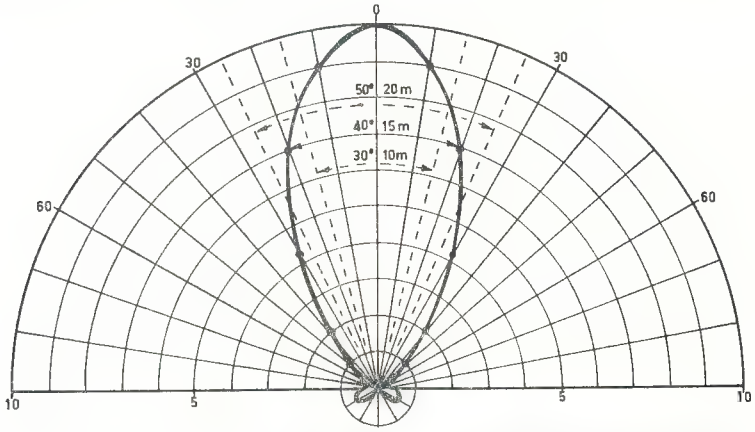

FIG. 7. Radiation pattern for DJ4VM quad for 20m, 15m (solid line) & 10m with driven reflector.

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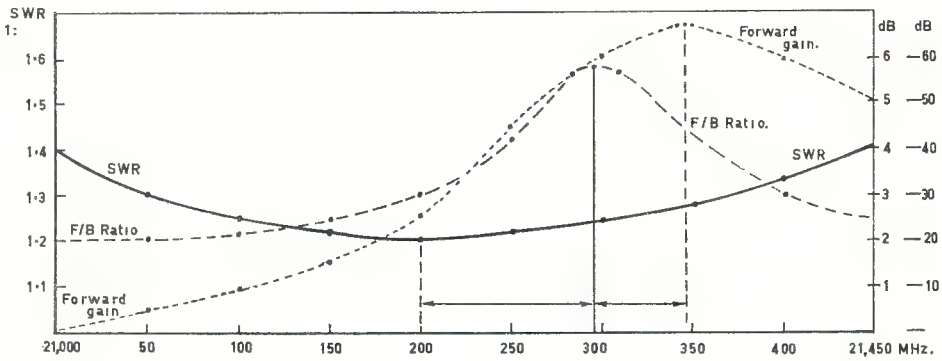


FIG. 8. F/B Ratio and forward gain variation of multiband quad (driven reflector) over 21 MHz band.

"IT"

A. J. C. THOMPSON, VK4AT*

We Radio Amateurs would not consider ourselves genuine unless we applied a little electronic touch to the solving of quite commonplace problems. We must be a sore trial to our more practical minded XYLs. This difference in our respective mental attitudes was startlingly illustrated quite recently on this particular radio active farm.

We have here a problem pup, much beloved until quite recently. His fall from grace was due to his base betrayal by an indignant hen. He was unlucky enough to get "copped" while still urging her to greater speed in the production of his breakfast egg. He repented on the chain with a sore tail, but this sad experience only endowed him with the knowledge that caution and silence were essential in all exploits hen-wise.

My own XYL, after much experimenting, has developed quite a standard technique. At the first sound of a triumphant hen she "hushes" me in elegant sign-language while she takes a couple of audio bearings to pin point the exact position of the chook. Then she rushes out casting one suspicious eye on our egg-eating pup and the other on a crow that lurks in the big fig-tree waiting for his breakfast too.

If no egg is forthcoming, then a very strained situation exists. Both the crow and the pup know where the egg is but she doesn't. The pup has the wrong technique under these circumstances. Anticipating an examination of his molars, he slinks off to his kennel, followed later by a wrathful XYL who ties him up. He gets in a couple of conciliatory licks on her face while her hands are so engaged, but it doesn't do him much good (or her either).

It was evident then that the situation badly needed that delicate electronic touch previously mentioned, that is so exclusive to such as us. Some trusting soul had providentially just given me an electric fence to fix. It already had quite a good "kick" but my junk-box produced the goods to make it even better. I tried it out on an old cow that always licked out the chooks feed tin and it worked fine. A china egg with a groove in it to take the wire, some fresh egg yolk for its aroma and for disguise, some insulating material and some well wetted ground were all that were needed extra.

Along comes the pup but he stalks past it as he remembered past tribulation over public displays with an egg as exhibit A. He sat down and scratched off a few imaginary fleas as he took stock of the situation, but, as no excitement had erupted from the house, he confidently returned. Cautiously he approached it, keeping a wary eye on the house. A quick removal to a more remote spot was standard practice, but the beautiful aroma of egg yolk that assailed his nostrils made him decide to give it just one delectable lick first. He was astonished! He didn't know if he let go of it or "It" let go of him, but he was first into his kennel and, although tightly jammed into the corner, it didn't take him long to be sure that "It" was not now with him too. He relaxed when he realised that he was temporarily safe. Then he gained enough confidence to even poke a little black nose and a suspicious eye out from his box. Re-assured, he ventured to give a few ferocious barks in the general direction of his enemy.

All was quiet. He ventured out, then hurried back (just in case . . .). He decided then that it had all been just one big mistake, so, out he came with his tail held high and jauntily strolled around looking for something to register a victory over, just to restore his shattered morale a bit. A fitting subject was right to hand in the outward garb of the family cat that he was currently feuding with. He cautiously sneaked up on her then "pounced". Puss, highly bred, and having nightmares, thus suddenly assaulted, fled up the electric light pole, but, on seeing the familiar pup as the cause of her fright, she descended inelegantly and stalked home, outraged dignity depicted in fluffed-out fur and quivering tail. She paused long enough to swipe him "fore and aft" when he enthusiastically tried to "tree" her for the second time. Pup ignored the scratches on his rear end to rub his lacerated nose through the long grass, even though it made him sneeze.

This brought him back to the vicinity of the egg. He was dismayed to see that a broody hen had beaten him to it, and, with happy clucky noises was just settling on it. From past experience he knew that clucky hens were hard to shift. They fluffed up their feathers with queer noises then pecked him on the nose. This one fortunately acted quite differently. She rose suddenly with much melody, exposing his precious egg, so he nicked in quickly and got it right from under her nose.

He wished he hadn't. "It" had got him again for sure, but fortunately let go of him while he was still in the air on the return journey. With his superior speed, he was again able to reach the safety of his own kennel. Temporarily safe, he then decided to stay put and just brood on the hard lives that pups lead on these farms where even the cows with calves kick playful puppies on the nose then roll them in the dirt and bellow in their ears. Now "It" had got his breakfast egg and bitten him twice. But he cheered up when he saw a silly hen approaching intent on swiping one of his discarded crusts. He hunched up ready to pounce. Now this was going to be **real** fun.

* Skyrings Creek, Pomona, Qld., 4568.

AMATEUR T.V.

(Continued from Page 7)

directly into the valve that is being modulated. A few basic circuits may give you the general idea.

Finally, before I close this article for this month, I would like to summarise what I have said.

Television, being a logical development of radio, should interest you Amateurs immensely, it should be a challenge for Amateur Radio. Seeing that some of our fellow Amateurs are not only capable of transmitting television signals but are capable of transmitting **colour**, the moment the P.M.G. gives Amateurs the go-ahead, don't you think that Amateurs could do a little better than they have up to date? It is up to you, prove the cynics who say "ATV is too hard to handle" wrong.

Even if you cannot become actively involved in video you can at least give a great deal of support to those who are by at least taking an interest. You can show this by at least receiving some of these chaps and giving them a signal report. If you would like any specific information about any facet of ATV at all please feel free to contact the ATV group in Sydney or contact me by letter at my address, which is:

Grahame L. Wilson,
29 Goodlands Avenue,
Thornleigh, N.S.W., 2120.

If you wish you also may phone me at the above address, the phone number being 84-5475 after 6 p.m. I hope you have enjoyed reading this article. I certainly enjoyed writing it. If you have liked it or you would like any particular item discussed, write to me personally or the Editor of "Amateur Radio."

In the next part I will be discussing cameras and the "systems" they employ with the theory behind it.

1969 VK4 SOUTH SEA ISLAND CONVENTION

This year the State Convention will be held at **Bribie Island** on the weekend of **7th and 8th June.** Mark your calendar now.

Council has had a preliminary discussion and May "QTC" will give final details. Also VK4WI will have up to date news.

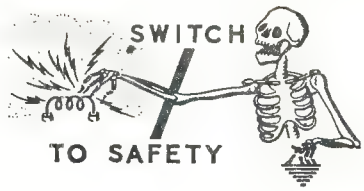
The Convention will have as its main interest a Saturday evening function along the lines of an Hawaiian night -casual dress, help yourself to dishes, music, laughing, talking—good fun consisting of a buffet meal followed by a full evening's entertainment which should cater for all. We hope to make this function a most memorable occasion and its success will be ensured by your attendance. It will not be a problem for many to return home if not staying that evening. Settle in on Saturday morning, visit places of interest, set up shop, etc.

Saturday afternoon will be set aside for technical sessions when it is proposed to have experts deal with printed circuits, interference problems, modern circuitry, r.t.t.y. equipment, etc., etc., with displays and opportunities for queries. Technical literature will be available. Of course, those who wish may surf, play bowls, swim, etc.

Sunday morning, VK4WI will be operating and h.f. and v.h.f. contests, together with displays, will be the order. Early afternoon is the time for a general meeting followed by presentation of trophies and the auction.

Accommodation will be to suit you and your pocket—camping, stationary caravans, motels, flats, luxury hotels. Men's single accommodation will also be provided. For bookings for any of these, contact Ross Cuttle, Cummings St., Bribie Island; phone 53-1070. Children will be catered for with competitions, organised games and entertainment.

Our planning will be simplified if we know you may come. Get a message through to us. Of course we **must** know who will be along on Saturday night for the dinner and fun.



VK-ZL-OCEANIA DX CONTEST 1968 RESULTS

AUSTRALIA AND NEW ZEALAND

C.w. Section

Call Sign	80	40	20	15	10	Total
VK2APK	—	2360	6555	5715	3230	17860
VK2GW	—	2300	5550	3220	2190	13260
VK2VN	745	2030	2390	1005	2110	8280
VK2QL	345	1265	2480	775	780	5645
VK2QK	—	—	5055	—	—	5055
VK2BRK	—	2325	—	—	—	2325
VK2AND	—	—	1690	—	—	1690
VK3QK	—	2690	6465	3100	1075	13330
VK3AXK	—	—	—	8185	—	8185
VK3YD	—	—	5340	—	—	5340
VK3ARX	—	—	4835	—	—	4835
VK3APN	1085	3305	—	—	—	4390
VK3QI	—	—	4020	—	—	4020
VK3ABA	—	—	—	3460	—	3460
VK3OP	565	2655	—	—	—	3220
VK3ABR	—	—	1370	1095	—	2465
VK3RJ	—	—	—	—	1790	1790
VK3QV	—	—	—	—	1390	1390
VK4FH	—	—	3270	5885	2115	11270
VK4VX	—	—	—	7745	—	7745
VK4XJ	—	—	—	—	5220	5220
VK4WO	—	—	255	1845	—	2100
VK4QW	—	—	550	—	—	550
VK5FM	—	—	2735	6035	745	9515
VK5FH	—	—	6720	—	—	6720
VK5BS	—	—	765	—	—	765
VK5KO check						
VK6UT	—	—	5515	2220	—	7735
VK6AJ	—	—	5050	—	—	5050
VK7GK	940	1505	5445	1000	—	8890
VK8HA	—	—	—	1885	—	1885
VK9DR	—	—	—	1350	1495	2845
VK9XI	—	—	850	200	—	1050
VK9KS check						
ZL1AJU	—	1285	7560	8270	5810	22925
ZL1AMO	—	795	6160	8610	955	16520
ZL1DV	110	1590	6070	5090	2690	15550
ZL1HV	—	355	3210	2240	2430	8235
ZL1DS	—	—	—	—	5485	5485
ZL1AIZ	—	—	1205	—	2195	3400
ZL1BDN	—	—	1590	—	—	1590
ZL2ANX	—	1815	9485	2275	375	13950
ZL2CD	—	1385	4660	5665	2130	13840
ZL2FA	—	—	9525	—	—	9525
ZL3GQ	—	2740	8060	5420	—	16220
ZL3IS	—	—	—	—	3020	3020
ZL4BO	165	2570	6160	6140	2845	17880

Phone Section

Call Sign	80	40	20	15	10	Total
VK1GD	—	370	9995	5575	6375	22315
VK2KM	—	2240	8925	6340	5635	23140
VK2APK	—	1590	8425	4630	4285	18930
VK2AOU	—	—	2325	2340	1825	6490
VK2RX	—	—	4165	—	—	4165
VK2ATZ	—	—	3075	470	—	3545
VK2AKV	—	—	—	1415	735	2150
VK2AND	—	—	1135	545	270	1950
VK3AXK	—	—	6075	5695	2500	14270
VK3QK	—	400	3895	3130	2745	10170
VK3VK	—	—	7280	805	1025	9110
VK3LW	—	—	6565	—	—	6565
VK3ARX	—	—	5500	—	—	5500
VK3SM	—	—	—	4430	—	4430
VK3MJ	—	—	—	3975	—	3975
VK3ABA	—	—	—	3970	—	3970
VK3QV	—	—	—	—	3005	3005
VK4LT	—	—	7290	1675	3625	12590
VK4SD	—	—	9389	—	—	9380
VK4VX	—	—	—	—	7685	7685
VK4SF	—	—	5970	—	—	5970
VK4LZ	—	—	4770	620	—	5390
VK4RF	—	—	4275	—	—	4275
VK4DO	—	—	3810	—	—	3810
VK4PJ	—	—	—	2850	—	2850
VK4QW	—	—	1070	—	—	1070
VK5FO	—	—	6490	4880	4525	15895
VK5WP	—	—	1730	4355	4420	10505
VK5FM	—	—	—	3815	2795	6610
VK6UT	—	—	9445	3735	—	13180
VK7GK	—	480	9480	4330	3520	17810
VK8CM	—	—	2330	2465	910	5705
VK9XI	—	—	630	120	55	805
VK9KS check						
ZL1AMN	—	155	7000	6615	2505	16275
ZL1HV	—	—	—	8115	—	8115
ZL1DS	—	—	—	—	5050	5050
ZL1AIZ	—	—	265	3055	55	3375
ZL1AGO	—	3090	—	—	—	3090
ZL1BDW	—	—	2000	1020	—	3020
ZL1AFQ	—	—	2450	—	—	2450
ZL1HD check						
ZL2AFZ	—	—	6655	860	—	7515
WA2NAZ ZL2ATL	—	—	4910	—	—	4910
ZL3IS	—	—	—	—	5130	5130
ZL3RT	—	—	2560	—	—	2560
ZL4BO	135	800	8930	4420	1950	16235

Listeners' Section

VK—L2342	4575	points
BERS195	5840	,,
L3377	5410	,,
L3395	2615	,,
L3308 check		
L4144	8275	,,
L4104	6275	,,
L5088	10865	,,
VK5-12245	4695	,,
L6021	20335	,,
ZL—ZL190	15450	,,
ZL149	13720	,,

VK BAND LEADERS

	C.w.		Phone	
A-B—	VK2APK	17860	VK2KM	23140
	VK3QK	13330	VK1GD	22315
	VK2GW	13260	VK2APK	18930
10 —	VK4XJ	5220	VK4VX	7685
	VK2APK	3230	VK1GD	6375
	VK2GW	2190	VK2KM	5635
15—	VK3AXK	8185	VK2KM	6340
	VK4VX	7745	VK3AXK	5695
	VK5FM	6035	VK1GD	5575
20 —	VK5FH	6720	VK1GD	9995
	VK2APK	6555	VK7GK	9480
	VK3QK	6465	VK6UT	9445
40—	VK3APN	3305	VK2KM	2240
	VK3QK	2690	VK2APK	1590
	VK3OP	2655	VK7GK	480
80 —	VK3APN	1085	Nil	
	VK7GK	940		
	VK2VN	745		

ZL BAND LEADERS

	C.w.		Phone	
A-B —	ZL1AJU	22925	ZL1AMN	16275
	ZL4BO	17880	ZL4BO	16235
	ZL1AMO	16520	ZL1HW	8115
10—	ZL1AJU	5810	ZL3IS	5130
	ZL1DS	5485	ZL1DS	5050
	ZL3IS	3020	ZL1AMN	2505
15—	ZL1AMO	8610	ZL1HW	8115
	ZL1AJU	8270	ZL1AMN	6615
	ZL4BO	6140	ZL4BO	4420
20 —	ZL2FA	9525	ZL4BO	8930
	ZL2ANX	9485	ZL1AMN	7000
	ZL3GQ	8060	ZL2AFZ	6655
40—	ZL3GQ	2740	ZL1AGO	3090
	ZL4BO	2570	ZL4BO	800
	ZL2ANX	1815	ZL1AMN	155
80—	ZL4BO	165	ZL4BO	135
	ZL1DV	110		

OVERSEAS

C.w. Section

North America

W1EVT	10530	WA5TPO	50
W1DTY	4172	K6HN	11427
W1AX	2352	K6AN	10175
W1ESN	484	W6RGG	7174
W1WY	352	K6HPZ	957
W1SWX	40	W6ID	360
W2LWI	6039	W6GBY	144
W2ZV	450	K6DDO	70
W8IBX/2	24	W7IR	11443
WA2HAI	3	K7VPF	24
W3NU	9923	W9VNE	3825
W3VKD	4890	W9IHN	2093
W3DPJ	24	W9LKI	952
W4OMW	1380	W0DYA	16
K4RDU	1092	VO1AW	90
W4BYB	496	VE3EWY	1350
W4KMS	168	VE3GCO	132
K4VQT	6	XE2AAG	154
W4HOS	297	KP4BBN	2080
W5BUK	3725		

Asia

JA1ADN	5518	JA3DEO	2047
JA1JKG	4123	JA3YKM	1869
JA1FGB	3757	JA4SZ	2832
JA1SR	3000	JA4XW	1166
JA1AYO	672	JA4IO	560
JA1SJV	320	JA4DCA	369
JA1PSW	80	JA4AKL	40
JA1XRH	24	JA4AQR/5	80
JH1AWI	12	JA6TQ	484
JA2CXF	6432	JA7CDV	5828
JA2WB	5880	JA7FC	3225
JA2LA	3836	JA8BB	630
JA2JAA	1722	JA9BKU	161
JA2CPD	880	JA0ADY	3007
JA2GTZ	858	JA0ASS	1602
JA2KRZ	504	JA0CDA	352
JA2KOW	208	JA0CHL	310
JA2YAR	48	JA0DVA	2
JA2ITH	8	JA0DJE	2
JA3LGG	4205	HL9KQ	1738

C.w. Section (continued)

Europe

DL7AA	4402	OK2WDC	64
DJ3WU	3240	OK1AII	48
DJ2YL	3068	OM2DB	40
DL1QT	1120	OM2QX	39
DJ4UF	644	OK1OO	16
DJ7PB	300	OM1CIJ	8
DL0LB (K)	2325	OM1EP check	
DL0PN check		OK2BCJ check	
DM2ATD	4818	OZ1LO	3712
DM2BJD	2976	OZ4PM	784
DM4WPL	1008	ON4XG	1344
DM2AUO	680	OH5UX	1920
DM4YEL	280	OH2OW	272
DM3MSF	240	OH5WH	256
DM3ZOC	56	OH1XX	234
DM2BHG	12	OH2BAD	99
DM2DEO	4	OH3TY	40
EA3KI	60	OH4RH check	
EA2HR	32	OH6NH check	
F3KW	690	LZ1AG	288
F9YZ	440	LZ1KAA	108
F3AT	240	LA9CE	120
F8SF	2	LA4K	2
G3SSO	2392	LA1H (K)	532
G5RP	1218	PA0VB	476
G2DC	720	PA0WAC	240
G3VMK	60	PA0UV check	
HA3MJ	300	SM7ANB	3402
HA5KFZ	50	SM3CXS	1640
HA5AF	24	SM0BYG	896
HA1KSS	2	SM7QY	832
HO0LC	2	SM7API	528
HB9KB	4867	SM5CLU	528
HB9GN	2160	SM3ARE	280
HB9DX	468	SM5CUN	98
IT1AGA	24	SM5BUS	80
OM2RZ	1540	SM3DVN	48
OM3OM	1062	SM5EXE	40
OK1AEZ	560	SM5APS check	
OM1XW	532	SP3AIJ	480
OK1TA	280	SP2PAH	432
OK1KYS	238	SP2AOB	24
OK3CDP	192	YU1BCD	992
OM3CEG	120	YU2FVW	216

U.S.S.R.

UA1KAQ (K)	504	UB5GG	96
UA1KAG	320	UT5HP	72
UA1ZL	133	UY5AP	24
UW1AY	2	UA6UO	224
UA3KBO (K)	4004	UW6AO	84
UA3UJ	3105	UD6BW	120
UW3NE	330	UD6AX	48
UA3TV	234	UF6LA	234
UA3KZO	208	UG6EA	60
UA3NP	150	UL7KAA	520
UA3KOE	48	UL7GW	300
UA3KHA	40	UH8DI	20
UA3GO	33	UH8DH	18
UA3TA	21	UI8FB	8
UC2KBK	658	UA9KCE	1520
UP2KBA	348	UW9PT	1368
UQ2GW	1024	UW9KDH	572
UQ2KCS (K)	198	UA9WL	462
UQ2KCT	48	UA9WS	416
UQ2NX	18	UA9UY	304
UR2FU	30	UA9DK	132
UR2BV	2	UA9HM	108
UA4IQ	990	UA9OO	108
UW4HW	204	UA9FN	56
UA4WT	156	UA9GC check	
UW4IB	80	UA0KZD	792
UA4KWB	40	UW0IF	590
UA4LU	24	UA0ML	530
UB5KLD (K)	1520	UA0LZ	414
UB5GX	930	UW0IW	60
UT5BY	341	UA0TD	51
UB5KDS (K)	168	UW0IQ check	

South America

PY2SO	1545	CE3ZW	8
LU4ECO	30		

Oceania

KH6GNE 4452

Phone Section

North America

W1DTY	644	W6ISQ	825
W2FCR	1476	K7RLS	1027
W3JNN	4805	WA7JRY	502
W3AKG	132	W8KIT	4031
W3DPJ	56	W0PAN	1224
W4HOS	848	W9ECV/0	828
W4WSF	114	VE3GCO	288
W4BYB	96	KP4BBN	64
W6GHM/5	8064	4A1LLS	2604
K5JEF (K)	6562	HR1KAS	1608
WA5EFN	1280	HP1JC	4440
WA6EPQ	14760	CO2FA	112

Europe

DJ2YL	8640	OZ2CE	108
DL7AA	5808	OZ4IA	2
DJ4LK	5365	OZ9CR check	
DL8PC	1974	OM1ADM	1566
DL0LB (K)	5580	OM2ABU	208
F3KW	5568	OM3BU	120
F9RM	462	OM2DB	96
F3AT	420	OM1HA check	
G3SSO	6016	OM1ADP check	
G5ALW	8	SM7AZL	4698
GW3NNF	1224	SM5API	1404
CT1MW	770	SM0BYG	1072
HA3MB	50	SM5BPJ	780
HB9KB	4611	SM7DMN	217
HB9UD	208	SM5BUS	160
I1AT	1092	SM3VE	20
I1AA	1040	SM5BNX check	
ON4XG	1704	PA0HBO	1498
ON5DJ	885	PA0ABM	95
ON4PL	240	PA0VB	60
OH7PI	6960	PA0CZA check	
OH2BC	2054	LA7VE	836
OH2BH	847	LA7AJ	540
OH2BAD	616	LA9CE	481
OH7QC	88	LA1H (K)	260
OH4RH check		LA7QI	44
OH8OW check		LA7VK	4
OZ3SK	3548	LA7JH check	
OZ1LO	2208	SP8AJK	726
OZ3KE	117		

Asia

JA1ADN	11970	JA4ERX	1794
JA1DNO	1480	JA4FM	564
JA1STN	708	JA4EMC	9
JA1SJV	636	JA5CBI	500
JA1BBU	506	JA5IU	9
JA1AAT	340	JA6YCU	12054
JA1JNM	320	JA6AD	11766
JA1BNW	234	JA6AFL	3213
JA1BHW	90	JA6IKN	40
JA1DMH	84	JA7CDU	8784
JA1BHX	72	JA7MA	7920
JH1JQU	4	JA7FC	2626
JA2CXF	8296	JA7CVW	210
JA2JAA	6699	JA7BKN	10
JA2DDN	3672	JA8BQB	7488
JA2EAD	1560	JA8EAT	8
JA2LXF	969	JA9BAB	2415
JA2BCI	40	JA9CHH	506
JA2HBE	18	JA0ADY	528
JA2ITH	10	JA0DAI	150
JA3DJ	9273	JA0DFL	24
JA3LGG	3952	KA7CW	420
JA3EVZ	858	9V1OE	288
JA3GNQ	840	HL9TT	1349
JA4XW	1989		

U.S.S.R.

UA1DJ	912	UH8BO	4
UA1FA	560	UA9OH	1416
UA3KBO (K)	6407	UA9BE	1330
UW3EH	440	UA9MR	546
UV3AAE	182	UW9WR	224
UA3KAG (K)	176	UA9PP	70
UP2ER	378	UV9OP	18
UR2AR	2314	UV9PI	18
UR2KAW (K)	2210	UA9MT	12
UW4IB	304	UV9OR	8
UB5WE	4290	UA0YP	1222
UB5FG	495	UA0DG	990
UT5GM	240	UA0NL	864
UB5OD	60	UA0SU	161
UO5BZ	8		

Oceania

KH6GNE	10620	DU1FH	21464
KH6GMP	3540	VR1L	26258
KH6GKI	2750	K0ILI/KG6	16124

Africa

ZS5OB	1314	CR6LF	48
ZS5OA	1278		

South America

OA4JR	1632	YV4IQ	90
OA4GQ	440	PY3AHJ	280

Listeners' Section

Europe

DM-EA3610/J	1066	I1-12843	—
DM-2542/L	1274	LA-M4811	414
DM-EA4604/J	460	LZ-2L93	12
DM-3676/L	32	OE-12680	—
EA4-1306	2622	ONL-383	—
EI-221	1200	HA5-146	2457
BRS26431	4806	HA6-020	440
A-5662	2730	HA2-007	676
G-1516	672	HA5-140	330
GW-7796	2988	HA5-153	12
HE9EVI	160		

North America

WPE-8JLL	450	WPE-9INP	112
WPE-9EIL	188		

Asia

JA0-1320/JA1	9100	JA2-3094	868
JA1-4876	1536	JA2-1885	494
JA1-8065	1410	JA6-2188	234
JA1-5966	1287	JA0-1893	4100
JA1-3989	473		

U.S.S.R.

UA1-13618	2484	UA3-170-200/UA9	624
UA3-127-202	374	UA9-165-55	198
UA3-127-11	300	UC2-0081	24
UA3-170-62	208	UQ2-037-10	300
UA3-142212 check		UP2-03864	858
UA4-0951	5412	UP2-0388	48
UA4-09476	1768	UB5-07325	1716
UA4-13321	210	UB5-0655	396
UA6-101-40	204	UB5-06519	360

ROSS HULL MEMORIAL V.H.F. CONTEST 1968-1969 RESULTS

TROPHY WINNER

VK5ZKR—C. M. HUTCHESSON

RESULTS TABLE

(Award Winners in bold type)

Call Sign	48-Hour Score	7-Day Score	Section
VK1VP	178	**213**	B
VK2ZCF	599	**1302**	B
VK2ZHR	128	268	B
VK2ZAH	228	228	B
VK2ZRE	40	110	B
VK3AKC	568	**2015**	B
VK3ZMS	256	872	B
VK3ZYO	188	804	B
VK3AOT	329	683	B
VK3ZOP	—	592	B
VK3AXV	166	570	B
VK3ZRG/T	224	523	B
VK3ABP	234	458	B
VK3AVJ	—	320	B
VK3ASV	105	275	B
VK3ZOS	—	75	B
VK4ZJT	266	**782**	B
VK4ZAZ/T	332	759	B
VK5ZKR	826	**2103**	B
VK5ZSD	392	737	B
VK5ZMW	280	719	B
VK5TN	50	95	B
VK6MM	—	**99**	B
VK7ZAH	332	**884**	B
VK7BQ	55	120	B

Receiving Section

VK3—Maurie Batt .... 529 pts.

VK5—S. Ruediger .... 682 pts.

Note: 1296 Mc. Australian and N.S.W. records were broken by contestants VK2ZCF and VK2ZAH, operating in the Contest on 28/12/68 (65 miles) and again by VK2ZCF on 5/1/69 (71 miles).

COMMENTS FROM THE LOGS

"Conditions for the 6 mx band really bad, fading out on 23/12/68 with few patchy openings during January, though on 26/1/69 a few JAs were heard at good strength in Sydney, though none were worked."—VK2ZHR.

"Feels that it would improve the Contest if separate band awards were given as an additive to the Contest." —VK3ZOP.

"Band conditions were quite poor. Of particular note, the absence of ZL and VK6 openings to this location. Also absence of short skip and 144 Mc. conditions."—VK4ZAZ/T.

"Rather poor 6 mx DX, but 2 mx made up for it from 7/12/68 to 12/1/69; 2 mx was open every day. On 3rd January, we even tried to get a number from the VK6 2 mx beacon, hi."—VK5ZMW.

"For the effort involved, if nothing else, to go on 576, the contact here was a three-day expedition. The points for 576 should be doubled from those set for this Contest."—VK5ZSD.

"6 metre scoring table ridiculous (for VK3 conditions), should be—

up to 50 miles .... 1 point
51-100 miles .... 5 points
101-200 miles .... 10 points

"Rules should have been published earlier. For scoring, the 432 table could be a little higher—it seems unrelated to average path loss compared with 2 mx. Otherwise, very good."—VK3AOT.

And so another v.h.f./u.h.f. contest passes with low activity on these bands. It is hoped that the future may be brighter. This year saw contestants competing for the trophy and only a narrow margin separating the winner and runner-up.

Perhaps next year will see a greater participation.

Looking forward to seeing YOUR log next year!

73. Neil Penfold, VK6ZDK, F.C.M.

☆

W.I.A. V.H.F.C.C.

New Members:

Cert. No.	Call	Confirmations 52 Mc.	144 Mc.
51	VK4ZRG	134	—
52	VK2AXI	114	—
53	VK3AQR	129	—
54	VK3AQR	—	203
55	VK3ZOP	—	105
56	VK3ASQ	—	108
57	VK3JS	—	225
58	VK3AOT	105	—
59	VK2ABC	102	—
	Amendments:		
44	VK3AMK	145	—
46	VK3ZNJ	230	—
47	VK3ZNJ	—	250

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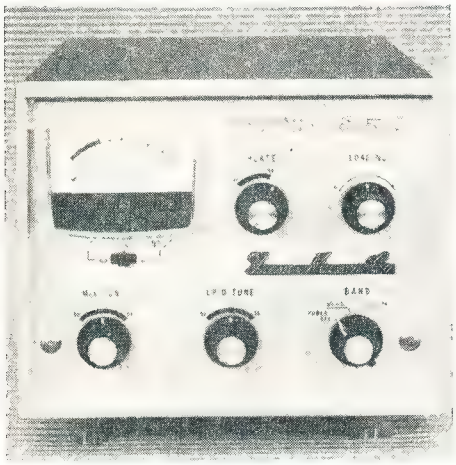
CONTEST CALENDAR

5th/6th July: R.S.G.B. 1.8 Mc. Contest.
5th/6th July: N.Z.A.R.T. Memorial Contest (3.5 Mc. only).
16th/17th August: Remembrance Day Contest.
4th/5th October: VK/ZL/Oceania DX Contest 1969—Phone Section.
11th/12th October: VK/ZL/Oceania DX Contest 1969—C.w. Section.
11th/12th October: R.S.G.B. 28 Mc. Telephony Contest.
25th/26th October: "CQ" W.W. DX Contest—Phone Section.
25th/26th October: R.S.G.B. 7 Mc. C.w. Contest.
29th/30th November: "CQ" W.W. DX Contest—C.w. Section.
6th Dec., 1969, to 11th Jan., 1970: Ross A. Hull Memorial Contest.
1st/2nd Feb., 1970: John Moyle National Field Day.

New Equipment

SIX METRE TRANSVERTER



The Yaesu Musen Model FTV-650 Six Metre Transverter takes a 28-30 Mc. signal and transverts to the six metre band in two ranges.

Transmitter: Input frequency range, 28-30 Mc.; input drive, up to 3v. r.m.s.; input, high impedance; input power to p.a. (S2001), 50w. d.c.; output frequency (two ranges), 50-52 Mc. and 52-54 Mc.; output impedance, 52-75 ohms.

Receiver: Frequency ranges, 50-52 Mc. and 52-54 Mc.; antenna input impedance, 50-75 ohms; sensitivity (when used with FRDX-400), better than 0.5 uV. for 10 db. S/N (s.s.b., c.w.), better than 1 uV. for 10 db. S/N (a.m., f.m.); image rejection, better than 50 db.; output frequency range, 28-30 Mc.; output impedance, 50-75 ohm unbalanced.

Power requirements (external): 6.3v. 3.5a. a.c., 150v. 30 mA. d.c., 300v. 50 mA. d.c., 600v. 150 mA. d.c., —100v. 20 mA. dc

Valves used: two 6CB6s, one 6AW8A, one 12BY7, one S2001 (p.a.).

Dimensions: 6¼" (plus feet) h., 8" w., 11½" d.

Further information from Bail Electronic Services, 60 Shannon St., Box Hill North, Vic., 3129.

PROVISIONAL SUNSPOT NUMBERS

DECEMBER 1968

Dependent on observation at Zurich Observatory and its stations in Locarno and Arosa.

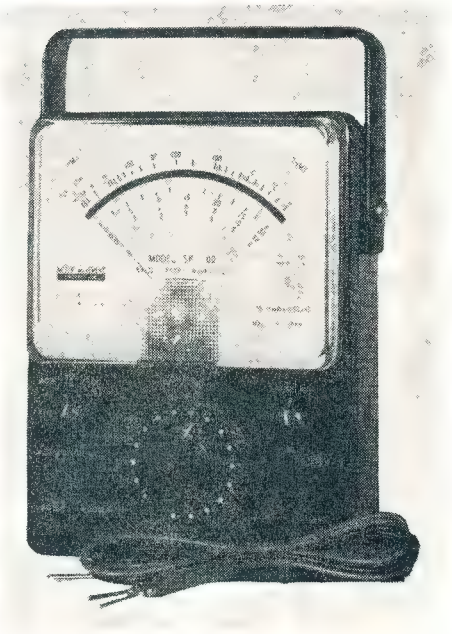
Day	R	Day	R
1	113	16	64
2	115	17	77
3	122	18	98
4	128	19	101
5	134	20	106
6	133	21	101
7	126	22	119
8	132	23	122
9	140	24	125
10	110	25	132
11	83	26	140
12	58	27	154
13	84	28	133
14	86	29	139
15	88	30	117
		31	119

Mean equals 112.9.

Smoothed Mean for June 1968: 107.0.

Swiss Federal Observatory, Zurich.

WIDE RANGE TESTER



The 'Rapar' Model SK-100 Tester is a full size meter suited for professional and Amateur use. Features include overload protection, mirror scale, and is fitted with nickel plated test prods.

Sensitivity: 100K o.p.v. on d.c.; 10K o.p.v. on a.c.

The 23 ranges include—DC Volts: 0-0.6, 3, 12, 60, 300, and 1200. AC Volts: 0-6, 30, 120, 300, 1200. DC Current: 0-12 uA., 300 uA., 6 mA., 600 mA., and 12 amp. AC Current: 0-12 amp. Ohms: 0-20.0 megohms in four ranges. Centre scale reading: 150 ohms, 1.5K, 15K, 150K. DB.: —20 to +17. (0 db. = 1 mW. in 600 ohm line).

Further details from Radio Parts Pty. Ltd., 562 Spencer St., Melbourne, Vic., 300, and City and East Malvern branches.

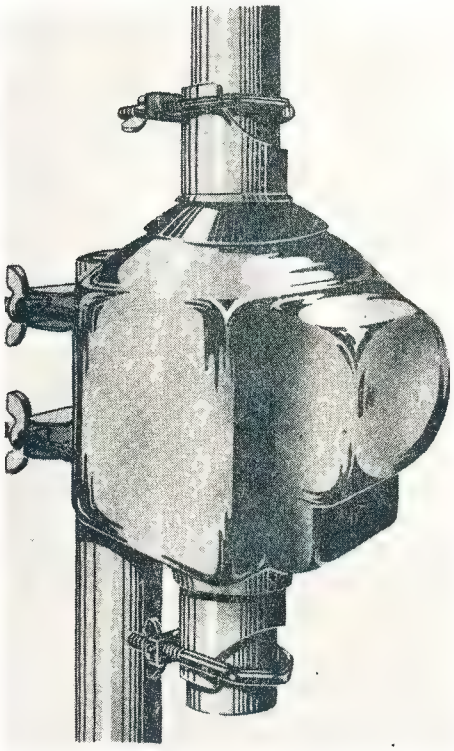
AUTOMATIC AERIAL ROTATOR

Designed to suit many applications requiring aerial rotation, the Stolle automatic rotator provides positive control from a fully synchronised unit by means of a balanced bridge circuit using transistor amplified control.

The connecting cable between the control unit and the drive unit operates from low voltage (42v.); when the rotation cycle is complete, the power shuts off automatically, and draws no current until it is activated again by turning the control knob.

The drive unit consists of a watertight cast metal housing with hollow shaft to take mast up to 1½" diam. Other features include: High carrying capacity (max. load 112 lb.), motor shaft bearings permanently lubricated, rotation angle 360 deg. (limited by stop at end of rotation), speed 1 rev. per minute, magnetic disc brake with self-restraining worm gear holds aerial in position.

The control unit is housed in an attractive moulded case, with 240 volt a.c. power supply (60w.). Push-button control sets the direction of rotation, left to right, while the dial indicator shows the direction of the aerial at all times.



Trade price: $45 plus sales tax. Further details from R. H. Cunningham Pty. Ltd., 608 Collins St., Melbourne, Vic., 3000.

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NEW W.A. BRANCH

R. H. Cunningham Pty. Ltd. have opened a branch office in Western Australia at 34 Wolya Way, Balga, Perth, 6061. Manager is Bob McGrath, and the phone 49-4919.

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RADIO PARTS CHIEF OVERSEAS

Mr. Allen Swann, governing director of Melbourne wholesale components house, Radio Parts Pty. Ltd., is currently in South America on a three months' holiday-business tour. Accompanied by his wife and daughter, Mr. Swann will visit principal capital cities and will investigate electronic manufacture and development. He is expected to return to Australia about May 24.

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TECHNICAL AWARDS

The awards for technical articles published during the year ended February 1969 have been made to the following Amateurs:

H. F. Ruckert, VK2AOU.
A. S. Lundy, VK2ASI.
R. B. Zielinski-Petersen, VK5ZIE.

The Publications Committee extends its congratulations to these gentlemen, and thanks them for their submissions.

Overseas Magazine Review

"QST"

December 1968—

What is R.T.T.Y.? K1PLP. Description of the process with the steps that need to be taken to get on the air on r.t.t.y. including modulating and demodulating techniques.

The Chirp Magnifier, WB2KVK/1. This is a device for increasing the amount of frequency drift or keying chirp from a v.f.o. An ordinary transistor radio can be used as an indicator if required. The answer for the "transceiver man".

Gimmicks and Gadgets, W6HDO. The author describes a converter to put v.h.f. f.m. 128-148 Mc. into the standard v.h.f. f.m. b.c. band of 88-108 Mc. and receive it on a normal f.m. receiver. Hardly applicable in Australia without an f.m. service.

A Solid State Product Detector for the HRO 60, W6PHF. A silicon diode ring de-modulator (detector) and i.f. stage module to improve s.s.b. and c.w. operation of an old standard receiver. This technique could probably be applied to a number of older receivers in use in Australia. AR7s could use this "as is," whilst AR88LFs, BC348s, AR8s, etc., will require a change in the i.f. amp. in the detector to suit the receiver being modified.

An Impedance Matching Method, K7KOK. Combining the balun and the L network. Design details are given for tuning networks for a number of Amateur bands.

Is a Balun Required? W1ICP. Lewis McCoy discusses the advantages and disadvantages to be obtained from the use of these devices.

Synchronous Weak Signal Detection with Real Time Averaging, WB6DEX and R. T. Kado. WB6DEX is W. R. (Ross) Adey, M.D., who was well known for his Amateur activities before leaving for the U.S.A. Ross describes a system of digging very weak signals out of the noise. The technique was developed for use in medical research and has now been applied to 144 Mc. moonbounce work.

A Solid State Audio Filter, WB6NMK. An a.f. filter using two 88 mH. telephone toroids (loading coils), one FET and an R.C.A. I.C. (CA3020) to be used with receivers or transceivers to give a bandwidth of 80 cycles at —6 db. The bandwidth is about the lowest practical limit as Morse at 25 w.p.m. needs a minimum bandwidth of about 75 cycles.

Further Improvements in the 32S-3, W4AX. A simple method of reducing spurious heterodyne products that have been observed in the output of the 32S-3 transmitter. Interested parties are also referred to a previous article by D. P. Shafer in "QST" Nov. 1964. It may be appropriate to point out to members that the Public Library in Melbourne and no doubt others also have "QST" and other overseas magazines available in the reading room. A copying service is available at reasonable prices.

A Two-Stage Transistor Pre-Amplifier for 1296 Mc., WA2VTR. Using special u.h.f. transistors, a low noise r.f. amplifier is described.

A 40 Ft. Self-Supporting Tilt-Over Mast for less than $50, W1YUT. With a title like that who needs a resume!

Combline V.h.f. Bandpass Filters, W2CQH. Since normal interdigital filters tend to be too large for convenient use at 144 or 50 Mc., the author loads the ends of the lines with capacitors.

"RADIO COMMUNICATION"

December 1968—

A Design for a Solid State Linear Amplifier, G2HIF. Factors essential to the stability and "fail safe" features of a 144 Mc. linear amplifier are discussed. The criteria for interstage coupling networks are established and a simple theoretical approach to the design is suggested. The parameters of a complete amplifier are determined in a worked example. This amplifier is stated to be capable of 20 watts p.e.p. (in British tradition, this should be output). It is a very neat design that appears to be reasonably easy to duplicate and could interest a large number of our v.h.f. men if the 2N3632 transistors are available at reasonable prices in Australia. It may also carry lessons for the h.f. men.

Technical Topics, G3VA. In this regular review type feature, Pat Hawker discusses "Linear Detection," and this is followed by "Narrow Band Hints from ZS6BT" who discusses the receiver requirement necessary for reception of weak c.w. DX in the presence of strong interfering signals. "What's happening in the co-ax?" F8ZF sent in details of a simple device for checking the current flowing in the outer sheath of the co-ax feeder. It consists simply of a toroid wound with a number of turns feeding a diode and an indicating meter. "Voice Peaks on S.s.b." and "Capacitively Loaded Dipoles" are the other two subjects discussed.

G3LUB R, C and L Bridge. The author sets out "the aim of the design" after the introduction, but, nowhere in the article does he set out a specification as it was achieved, nor does he give a clear indication of the order of accuracy to be expected from the bridge. This latter probably depends upon the calibrating facilities available to the builder and the in-built precision of one or two critical components. This is probably the most detailed bridge construction article which has been published.

"SHORT WAVE MAGAZINE"

December 1968—

Direct Reading Reflectometer, G3UXP. This unit which is based on the Monimatch design from "QST" has a number of things to recommend it. Firstly, two 50 uA. meters are used with individual adjustment pots, semi air-spaced dielectric co-ax is used which makes for easy insertion of the pick-up wires, the design will give f.s.d. of the meters with less than 10w. input on 1.8 Mc., and the unit is very neatly built into an Eddystone type die-cast box.

R.T.T.Y. Station Control Simplifier, G8LT. This is a continuation of the article which commenced in the November issue of this journal.

Reversing the Car Electrics, G3ESP. In these days of alternators, it is, of course, necessary to make major alterations to the device itself before one can be successful. With a generator, the matter is much simpler. The author describes the way to go about it. I have heard that with most cars it is only necessary to (1) reverse the battery polarity, (2) momentarily close the cut-out manually, (3) start vehicle and check that charging is now taking place in the reverse direction.

Notes on the Trio JR-500S Receiver, G2HR. Having purchased an inexpensive receiver and become aware of its shortcomings, the author proceeds to modify it and overcome them.

Centre Fed Multi Band Aerials, G3OGR. Design considerations for various types, feeding and tuning. Simple series and parallel tuner.

Rotatable Mast for Beam Working, G3MQV. The design of a simple unit for manual operation is described.

Transistor Converter for Four Metres, G3PRX. A mini converter to suit a tunable i.f. of around 20 Mc. is described.

The ZL Mini Quad, G3PHO/ZL2BDA. The 20 mx quad is only 10 feet on a side and elements are spaced 7 ft. 9 in. apart. Both elements are driven. The author reports that skeds with friends in G-land could not be considered satisfactory until he built this quad. After completion there was no trouble. Of course by shortening some elements it would be possible to make a quad for 40 which was no bigger than the usual 20 mx quad. What say someone? VK3AAR at Warrnambool is supposed to have one.

"73"

November 1968—

Computer Card Transmitter, K1EUJ. Plug-in components. (Grid leaks do not plug in!)

Crystal Filters, W3RET. The heart of s.s.b. This is an article which intrigued your reviewer greatly on a number of points. (1) The author is employed by McCoy Electronics. (2) He specifies his so-called ideal characteristics such as 6 to 60 db. shape factors of about 1.5 or less. (3) McCoy Electronics advert on p. 15 quotes the Silver Sentinel 32B1 and Golden Guardian 48B1 shape factor 6 to 50 db., 1.8/1 and 1.53/1.

Pop ups are shown about 45 db. down on the 32B1 and 55 db. down on 48B1, showing that the ultimate rejection is worse than the figures quoted by the author as desirable and since McCoy have sold filters for some time, one would believe, attainable. Maybe there is a strong argument for the home grown product which, although it may not be better than the highly advertised U.S. line, is cheaper and no worse.

Trouble Shooting Solid State, K3PBY. Modern day problems solved—the author discusses methods of trouble shooting solid state circuits.

I.C. Frequency Counter, WB6IBS. Easy to build counter for Amateur applications. An interesting article for the ardent solid state fan. The author claims the 20 Mc. counter can be built with $120 (U.S.) worth of semiconductors, etc.

C.V. Transformers for Ham Applications, WA9CQN. Constant voltage transformers are very useful devices and with most pieces of equipment are very useful for maintaining a constant voltage in the shack. Notwithstanding this, some equipment, especially if fitted with electronic d.c. regulators, does not take kindly to the waveform distortion inherent in the output of a c.v.t Voltage should be measured by a moving iron meter or current by moving iron, hot-wire or thermocouple type r.m.s. reading instruments.

A Space Communications Odyssey, K6BW. It isn't going to be easy to keep in touch. Perhaps one should ask him if space travel is easy?

Surprise in the Skies, W1EZT. Pulsars—what are they?

Using Thin Wire Antennas, W2EEY/1. Fooling the landlord, or what the eye does not see the heart does not grieve.

A 7 Mc. Transistor Transmitter, WA6JND. An all transistor rig for 40 mx running 8-10 watts input and with a t.r.f. receiver in the same box. Battery operation all summer from one 45v. super duty B battery. This seems a good place for one of those small b.c. receiver/converter type superhet rx's with b.f.o.

Double Conversion of the BC348M, VU2TV. By using the l.f. strip at 85 Kc. from a BC453 he double converts his BC348 and makes it suitable for s.s.b.

The Gentrac, W6AJZ. A "do all" test set for receivers—the name on close investigation comes from "Generating and Tracing". According to the author it does what he says it will—all solid state too.

Harness Your Wiring, K5LLI. A professional wiring job for home-brew of lovely, laced looms!

Copper Wire, W1EZT. The forgotten component. The author discusses wire conductivity of various metals and alloys, wire gauges, etc.

Who Says You Can't Take It With You? WB6ABM. Or taking the Amateur station to college.

The Thermistor, WB6BIH. How to use this device for measuring purposes, especially temperature measurement.

Using S.C.R. in R.T.T.Y. Series Wound Motor, W8NSO. Some teletype machines use series type drive motors with a contactor type governor and consequent sparking at the contacts, which interferes with reception. Our hero used an S.C.R. to conquer the demon spark.

New High Voltage Transistors, K3VKC. The author lists type numbers with BVcbo from 90 to 1000v.

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FAIRCHILD INSTRUMENTS

Details will shortly be released of the range of Fairchild instruments available in Australia direct from Fairchild.

The Fairchild instrumentation range offers industry a broad line of digital multimeters, panel meters, electronic time and frequency measurement instruments and a curve tracer that is fully programmable.

The following instruments will be available:

Model 7050—A low cost digital multimeter.
Model 7000—A half rack digital multimeter.
Model 7200—An integrating digital multimeter.
Panel mounting digital meters:
Model 8040—A low cost frequency meter.
Model 8050—A 30 Mc. frequency/period meter.
Model 8220—A 500 Mc. digital frequency meter.

After-sales service will be provided and all information re availability, specifications, etc., can be obtained by contacting Fairchild at their Croydon, Victoria, production plant, or any of the Fairchild representatives.

1969 Annual Report to Federal Council

The Federal Council of the W.I.A.,
Gentlemen,

PREAMBLE

I present to you, on behalf of the Federal Executive, a report on its activities during the period subsequent to the 1968 Sydney Federal Convention, as required by section 33 (iv.) of the Federal Constitution.

The report follows the six sections traditionally used to classify motions at a Federal Convention, and deals with each section in turn. For each matter, where possible, I present a statement in the following form:—

(a) Institute policy.
(b) Subsequent actions.
(c) Future determinations.

In beginning this report, I wish to state that I have throughout referred to "Executive" or "members of Executive" in relation to the matters attended to on behalf of the Institute. I have done so because I feel that W.I.A. officers accept a duty to work on behalf of the organisation. The satisfaction gained is gained because the organisation is strong and active. I believe that any kudos attracted by actions of W.I.A. officers should attach to the W.I.A.

Of course, it is a corollary that the organisation cannot progress without hard work being done by its honorary officers, and administrative staff. To the members of Executive who have given me, and therefore the Institute, such fine support, I am grateful and thankful for a job well done!

1968-69 FEDERAL OFFICERS

Federal Executive—

Federal President: John Battrick, VK3OR.
Federal Vice-President: Michael Owen, VK3KI.
Federal Secretary: Peter Williams, VK3IZ.
Federal I.T.U. Liaison Officer: George Pither, VK3VX.
Federal Treasurer: Kevin Connelly, VK3ARD.
Federal Executive Member: Alf Seedsman, VK3IE.
Federal Activities Officer: David Rankin, VK3QV.

Federal Co-ordinators of Activities—

Federal QSL: Ray Jones, VK3RJ.
Federal Intruder Watch: David Wardlaw, VK3ADW.
"Amateur Radio" Editor: Ken Pincott, VK3AFJ.
Federal S.W.L.: Eric Trebilcock.
Federal Awards Manager: Geoff Wilson, VK-3AMK.
Federal Contests: Neil Penfold, VK6ZDK.
Federal W.I.A. Y.R.S.: Jim Webster, VK2ZCW.
Federal Repeaters: Chris Jones, VK2ZDD.
Federal Historian: George Glover, VK3AG.
Overseas Publications: Alf Chandler, VK3LC.

Immediate Past Federal President—

Max Hull, VK3ZS.

Section I.—CONSTITUTIONAL MATTERS

PROPOSED NEW FEDERAL CONSTITUTION

It was reported to the last Federal Convention that the solicitors acting on behalf of the Institute in relation to this matter had said that further delay was likely. In the course of this year, Executive was advised by the solicitors that except in relation to four matters, the articles as drawn would be granted the Attorney-General's approval. With one exception, the matters were of a minor machinery nature. The only troubling aspect was in relation to the proposed postal referendum. These provisions had been inserted at the request of the N.S.W. Division and had been the subject of extensive debate.

The matter has been referred to the Divisions for instructions. Once the Divisions are in agreement as to what course is to be adopted, Executive is confident that this long outstanding matter can be finalised. An appropriate motion has been submitted to Federal Council for consideration at the Federal Convention:—

Motion 1969 1.1: "That this Federal Council formulate an instruction to the W.I.A. solicitors to enable them to proceed with the submission of draft memoranda and articles of association to the Attorney-General".—Moved F.E.

EXISTING FEDERAL CONSTITUTION

During the year, Federal Secretary has undertaken a great amount of research through back records of the Institute in order to check the exact constitutional position at this time. Executive will prepare copies of the present Federal Constitution embodying all past amendments and being completely up-dated. Federal Councillors will thus all have a copy of the existing Constitution in common form.

A number of motions referring to amendments of the present "old" Constitution will be before the 1969 Convention for discussion, and I commend to you a perusal of Section X. which lays down the procedure to be adopted if it is wished to amend the existing Constitution.

Section II.—POLICY ITEMS

"AMATEUR RADIO" MAGAZINE

(a) **Policy 1968/2.1:** "That the cost of 'Amateur Radio' to the Divisions be increased" was moved by the publishers, the Victorian Division, who sought an increase in the cost to members of five cents per copy. This would have brought the cost up from fifteen cents to twenty cents per copy. However, after long debate, this motion was lost. Following that motion, the Queensland Division introduced two "motions arising":—

2.1.1.: "That a sub-committee be formed to urgently investigate all aspects of 'Amateur Radio' production comprising representatives from VK3 Division and Federal Executive," and also:

2.1.2: "That the cost of 'Amateur Radio' to Divisions be increased by twenty-four cents per member p.a."

These two motions were carried by majority.

(b) **Subsequent Action:** The Publications Committee of the Victorian Division has increased the cost to members from fifteen to seventeen cents per copy for 1968-9, and the effect of this will be a matter for its report and financial statement. Executive appointed Federal Vice-President VK3KI to convene a sub-committee as directed by 1968/2.1.1, and he was joined by Federal Treasurer VK3ARD, Victorian President VK3YQ and the Editor of "Amateur Radio," VK3AFJ. This sub-committee undertook a very detailed investigation, over a period of six months, of all aspects of publishing "Amateur Radio". The committee has concluded its investigations and has submitted a twenty-page report to Federal Council. The convener stated that he was satisfied that the Publications Committee was doing a most demanding job in a most responsible way. He thanked the Editor and VK3 President for the many hours put into this work over six months, and also thanked Don Watson, VK4DZ, who sent quite a lot of constructive material and comment to the committee.

During the time the sub-committee was carrying out its investigation, close liaison was maintained between Federal Executive and the Division publishing the magazine on behalf of Federal Council. Both the VK3 President and the Editor of "Amateur Radio" attended Federal Executive meetings to discuss matters pertaining to "Amateur Radio", and the Executive was at one stage asked to state its views on the future of "Amateur Radio", which it did in the following resolution:

"Federal Executive acknowledges the vast amount of effort put into the collection of material for submission to Divisions by K. Pincott. Federal Executive does not presume to direct the publisher in relation to the future of the magazine, but suggests that the following points should be acceptable—

1. The magazine should continue to be published.
2. Any arrangement by virtue of which the provision of working capital is not a burden on the Institute or on a Division is desirable, subject to the retention of editorial control by the Institute.
3. Any arrangement should result in some profit to the Institute.
4. F.E. recognise that the negotiations towards these ends must be left in the hands of the publishers."

The sub-committee investigated and reported on:—

(a) "Outside" publication of "Amateur Radio".
(b) Actual costs of "Amateur Radio".
(c) Future costs of "Amateur Radio".
(d) Letter from VK4DZ.
(e) General matters.

The sub-committee reached the following four general conclusions:—

1. That "Amateur Radio" in anything like its present form cannot reasonably be produced more cheaply by other methods by other printers.
2. A partial solution lies in the future exploitation of the advertising potential of the magazine, and to achieve this it is economic to utilise the services of a specialised advertising agency. This had already been done.
3. That if Divisions wish Divisional Notes to be restored or any other feature to be added, this will involve additional cost (in the case of Divisional Notes, 3 cents). In the last resort this is a decision for the Divisions, not the publishing Division, as in fixing a price the Divisions must accept responsibility for the magazine content.
4. It seems likely that costs will continue to increase. It will be reasonable for the publishing Division to continue to seek price increases. These cannot, at this time, (November 1968) be quantified; all we can say is that we are satisfied that further cost increases cannot be absorbed.

During the investigation it became apparent that more data was needed by the publishers to assist them in making decisions relating to the magazine. Accordingly a questionnaire was included in "Amateur Radio"—this has been reported on in recent issues, and a "Federal Comment" in a recent issue referred to the overwhelming response to an offer to supply a complimentary copy to a friend. A statement of costs of the magazine to W.I.A. members as compared to the cost of direct subscription was also mentioned.

In addition to the material supplied by Queensland Division, N.S.W. Division made other comments which were referred to the sub-committee. One of these referred to the transfer of all publications to Federal Executive control in accordance with the new Constitution. Another comment referred to the deletion of "Pubcom" reports from "Amateur Radio"—Executive passed this matter to the Editor for comment and his reply was forwarded to the N.S.W. Division.

During the year, Executive has continued to use the official organ of the Institute to inform members on various matters.

(c) **Future Determinations:** At the 1969 Canberra Convention, the Publications Committee of VK3 Division will report on last year's activities, and it is hoped that Federal Council will come to some agreement on the future of the "official organ" of the Institute. I believe that any agreement must be realistic from the economic point of view, if Federal Council wish one Division to publish on its behalf. VK3—the publishing Division—has again moved that: "The price of 'Amateur Radio' to Divisions be increased."

The aspect of publication of "Amateur Radio" by Executive raised by VK2 Division during the year will have to await the adoption by the Institute of the proposed new Federal Constitution. As pointed out earlier, Executive has asked for instructions on this constitutional aspect.

YOUTH RADIO SCHEME MATTERS

(a) **Policy:** These matters were raised at the 1968 Convention as a result of motions moved by the N.S.W. Division, viz.:

1968/2.2: "That Federal Convention confirm that the title of the Y.R.S. is 'Wireless Institute of Australia, Youth Radio Club Scheme ——— Division' and that the scheme is an educational instrument of the Wireless Institute of Australia for the promotion of radio and electronics in schools and clubs."

1968/2.3: "That in view of the fact that so many members of the Youth Radio Club Scheme are not members of the Wireless Institute of Australia, that the Federal Convention

encourage all Divisions to institute a form of student membership at a nominal cost to Youth Radio Club Scheme members."

1968/2.4: "That in view of the Youth Radio Club Scheme of Victoria and its associated correspondence section claiming to be affiliated with and not under the control of the Wireless Institute of Australia, that the Federal Convention endeavour to strengthen the bonds between these two bodies and the Wireless Institute of Australia."

These should be read in conjunction with 1966 motion 2.7.1: "That the W.I.A. provides a service for Youth Radio Clubs designed to assist the development of these Clubs. It cannot accept any responsibility for any action or views expressed by or on behalf of any club and that the substance of this motion be generally made known."

(b) **Subsequent Action**: Following the 1968 W.I.A. Federal Convention, a meeting of teachers assisting with Y.R.S. activities was held in Melbourne. These were Y.R.C.S. Supervisors from VK2, 3, 5 and 7, and others, and I attended their Convention by invitation. The meeting decided to form a Federal co-ordinating body of their own—the Y.R.C.S.A.—for co-ordinating syllabuses, standards, administration, etc. The meeting expressed a desire for close co-operation with W.I.A., and a wish to be affiliated with W.I.A. but not controlled by it.

The Federal Executive was later supplied with a copy of the motions passed at the Y.R.C.S. Convention by the teachers attending, and W.I.A. Divisions were also supplied with the Y.R.C.S.A. motions. Subsequent to that the N.S.W. Division drew Executive's attention to the decisions made in Melbourne in June with regard to the name of the Y.R.S. They also requested Executive to take immediate steps to ensure that the policy of the Institute was adhered to.

Executive referred the matter to Federal Co-ordinator of W.I.A. Y.R.S. and asked for clarification of the relationship between Y.R.C.S.A. and W.I.A. Y.R.S. He replied in terms which indicated that Y.R.C.S. was in effect a "separate" body with its own organisation, but was affiliated with the W.I.A. in different ways in different States.

After much discussion between Divisions and Executive on the matter, Executive requested the Federal W.I.A. Y.R.S. Co-ordinator to implement W.I.A. policy as it affected Youth Radio Clubs.

It is pleasing for Executive to note from reports that the Youth Radio Scheme is indeed flourishing. Executive thanks the teachers who are assisting W.I.A. with its objectives.

(c) **Future Determinations**: No motions on Y.R.S. matters have been brought forward for the 1969 Convention. There will be a report from W.I.A. Y.R.S. Co-ordinator to consider. No reports on how Divisions have complied with Motion 1968/2.3 have been received by Executive, nor has any report been submitted on 1968/2.4.

NOVICE LICENSING

(a) **Policy**: This was determined in 1959 and amended in 1962 and 1965. The policy item FED 17 thus read:

"That the following proposals regarding Novice Amateur Transmitting Licences be used as a basis of negotiation by Federal Executive with the appropriate authorities—

(a) Morse code test of 5 w.p.m.
(b) Elementary examination in radio theory (at a lower standard than required for A.O.C.P.) and P.M.G. regulations.
(c) Operation to be allowed on the 3.5, 27 and 28 Mc. bands using c.w. only, and crystal control.
(d) Power maximum 10 watts.
(e) The A.O.C.P. examination must be taken by the end of 12 months, the licences not to be renewable except at the discretion of the P.M.G's Department."

At the 1968 Convention the following motion was passed:

1968/2.5: "That the Institute no longer advocate the issue of Novice Licences by the Australian Administration, with the reduction in the code standard," and then a motion arising was carried:

1968/2.5.1: "That the Federal policy item Fed. 17 be amended by adding the words 'if and when considered desirable'."

(b) **Subsequent Action**: Executive has undertaken no activity in relation to Novice licensing, believing that there is no current W.I.A. policy in relation to Novice licensing following 1968/2.5.

(c) **Future Determinations**: At the 1969 Convention, the Federal policy book will be amended as a matter of course. Executive will request some guidance from Federal Council in relation to an apparent conflict between 1968/2.5 and the motion arising 1968/2.5.1.

CODE SPEED TESTS

(a) **Policy**: This was determined at the 1968 Federal Convention by two motions brought forward by the VK7 Division and passed by Federal Council:

1968/2.6: "That Federal Executive consider the introduction of code speed tests within and conducted by the W.I.A. with a view to allowing any member so wishing to increase his code speed and be able to obtain a proficiency award."

1968/2.7: "That Federal Executive produce if necessary a code proficiency certificate to which code proficiency awards could be attached."

(b) **Subsequent Action**: Executive has been unable to consider this with sufficient attention to be able to suggest any action at this stage. The matter was discussed briefly with the VK7 Council by Federal President and Vice-President during a recent visit to Tasmania. The matter is still being considered by Executive.

Section III.—ADMINISTRATION: I.T.U. FUND MONIES

(a) **Policy**: This stemmed originally from the policy item Fed. 18 inserted in 1963:

"That the following plan for the next I.T.U. Conference be implemented—

(1) That F.E. maintain a brief for the official W.I.A. representative.
(2) That means of financing representation be implemented immediately.
(3) That by Easter 1965, the Divisions shall raise a minimum total of £3,500 ($7,000) by a minimum contribution as follows—VK2, £1,300 (2,600); VK3, £800 ($1,600); VK4, £425 ($950); VK5, £550 (1,100); VK6, £225 ($450); VK7, £200 ($400).
(4) That the said fund collected by the Divisions be paid to Federal Executive each six (6) months and Federal Executive shall hold the same in the I.T.U. Fund."

In addition, policy item I 01: "That after the targets for the I.T.U. Fund have been achieved, all future monies collected for similar purposes be collected in a general fund for the representation of the Amateur Service."

And motion 1967/3.5: "That in accordance with G.B. item 1 of the 1966 Federal Convention those Divisions who have not fulfilled the quota laid down do so from Divisional funds immediately" refer to I.T.U. Fund monies.

At the 1968 Federal Convention a number of motions were brought forward relating to handling of I.T.U. monies. Only one of these was carried:

1968/3.2.1: "That the Executive transfer the I.T.U. Fund into a separate bank account on or before the 31st day of May, 1968, and that to the balance shown in the accounts of the Institute dated the 28th day of February, 1968, and any further contributions to the fund received by the Executive after the 28th of February, 1968, shall be added the sum of $300 which shall be deemed to represent the interest which would otherwise have accrued to the Fund from the first day of March, 1964, until the 31st day of May, 1968."

This motion gave direction to Executive on the matter of interest accruing to I.T.U. monies, and established a policy for banking procedures.

(b) **Subsequent Actions**: Following the 1968 Convention, Executive took steps to comply with this motion 1968/3.2.1., and I.T.U. monies are now contained in a separate bank account, and earning interest. The VK3, 4, 5, 6 and 7 Divisions have filled their quotas as specified in Fed. 18, in accordance with 1967/3.5.

(c) **Further Determinations**: At the 1969 Federal Convention, Federal Treasurer will present a financial report which will refer in detail to these I.T.U. Fund matters. The amount held in the special bank account is $6,306 at the present time.

Section IV.—I.T.U./I.A.R.U. MATTERS

REGION III.

(a) **Policy**: Motions setting the background to Region III. activities are from 1966 and 1967 Conventions, at which times Federal Council conducted long debates on these matters. At the Hobart Convention, motion 1967/4.1 was passed:

"That Federal Council examine the way and the means by which liaison and assistance can be given to other countries in Region III. and outline a policy embracing one or more of the attached proposals, alternatives and questions."

During discussions on that motion, Divisions agreed that Executive should investigate the whole matter and put a proposition to the W.I.A. Motion 4.1.1 formalised this agreement:

"That the Executive prepare a detailed submission suggesting a policy to be adopted in relation to the Amateur Service in South East Asia and the remainder of Region III."

In addition, 1967/4.5 was discussed:

"That after due consideration of the attached Region III. report and any other evidence, Federal Council outline its policy on the five questions listed at the conclusion of the said report."

Further long discussion revealed that Federal Council needed more time for reflection and more information on Region III. before coming to a view. Accordingly, it was resolved:

"That debate on this motion (4.5) be adjourned 'sine die'."

Following the 1967 Convention, Executive members contributed articles to "Amateur Radio", Executive circulated material to the Divisions, and appointed a sub-committee to implement 1967/4.1 which issued a proposal. During the year, an Executive member visited many overseas countries during the course of a business trip, and kept F.E. informed on current thinking overseas.

As a result of these reports sent back to Executive, it was decided to recommend to the W.I.A. that a "Region III. Congress" be called and that it be held concurrently with the 1968 W.I.A. Convention in Sydney. W.I.A. agreed to this, and accordingly Executive issued the necessary invitations and the Region III. Congress is now a matter of record.

At the 1968 W.I.A. Convention, several motions and resolutions were passed unanimously: It was resolved that "Federal Council of W.I.A. endorses the action of Federal Executive in convening the inaugural Region III. Congress, and also states that it will consider financial support to any Region III. organisation formed as a result of the Congress".

That resolution was delivered formally to the opening session of I.A.R.U. Region III. Congress that evening, Friday, 12th April, as representing Australia's position.

1968/4.1: "That immediate action be taken to implement the aims arising from the discussions under items 4.2, 4.3, 4.4 of the 1966 Federal Convention, items 4.1, 4.5, 1967 Federal Convention, and subsequent action taken by Federal Executive in relation to Region III. organisation."

1968/4.1.1: "That the W.I.A. shall contribute $600 by December 1968 as its contribution to the I.A.R.U. Region III. organisation, and a similar sum by December 1969 and December 1970, and to provide such sum each Division shall collect 20 cents in respect of each of its members in each of the years."

1968/4.1.2: "That Federal Secretary convey the following statement to I.A.R.U. Region III. Congress:

1. The W.I.A. thanks the Amateur Societies of Japan, New Zealand and the Philippines, and the I.A.R.U. Headquarters for sending delegates to this inaugural meeting of Region III. Societies.
2. The W.I.A. is desirous of joining with these countries in co-operating to achieve a workable regional organisation, and if the participants at the Congress so request, W.I.A. will offer what administrative assistance it can, and provide what office-bearers are requested.
3. The W.I.A. will authorise its Federal Executive to contribute $600 each year for this triennium ending May 1971 to assist the regional organisation's finances. This sum will be reviewed before the second triennium commences."

Following the Region III. Congress a statement was issued which included the following points on organisation:

"It was resolved that there will be a board of directors, one from each Society represented and appointed by that Society. The President of the I.A.R.U. also to be a Director. The Wireless Institute of Australia is to provide a Secretariat and will be appointed by this Institute in consultation with the W.I.A. Director.

"It was further resolved that monies will be contributed by the Societies of Japan, Australia, New Zealand and the Philippines in proportion to their resources, such monies to be applied to purposes approved by the directorate.

"The meeting resolved that the Secretariat formulate draft rules to be circulated amongst Directors for discussion, and that subsequent opinions will be collated by the Secretariat and re-circulated to the Directors with a view to their adoption at the next Plenary.

"It was resolved that Directors and Secretariat plan future Directors' meetings.

"The meeting placed on record its gratitude for the offer of J.A.R.L. to hold the next Plenary meeting in Tokyo 1971."

(b) **Subsequent Action**: Letters and expressions of thanks for the action of the Institute in calling the Congress were received from overseas countries. The delegates from J.A.R.L. made a presentation to the Federal President of a Yaesu Musen FT-DX-400 transceiver which was received on behalf of the Institute, and placed in the Institute's station VK3WIA. All participants in the Congress and Convention expressed their appreciation of the excellent facilties and gracious hospitality provided by the Institute. Federal President thanked the N.S.W. Division for organising the facilities and hospitality which were very appropriate to the occasion.

Following the Region III. Congress, Federal Executive was faced with a statement from the Congress that amounted to little more than a broad expression of general policy. To a lesser extent, the motions passed by Federal Council dealing with these matters could be categorised in a like manner.

It was, at least, clear that the W.I.A. was to appoint a "Secretariat" in "consultation" with the W.I.A. Director. Of immediate concern to us was the fact that the participating Societies had undertaken to provide funds for the new organisation. These monies were to be remitted to the W.I.A. as providing the Secretariat.

The Executive took advice on the matter generally, and were told, firstly, that no "Club" or similar organisation could exist apart from its "rules" or other constitution, and the "statement" from the Congress in Sydney did not "create" any organisation. Secondly, if monies were collected on behalf of a non-existent organiastion and then expended (even with the best intention in the world and in accordance with the general tenor of the Congress statement) this would be at the risk of the W.I.A. and, more particularly, at the personal risk of those officers of the W.I.A. who authorised the payment.

It was also pointed out that if money was merely collected and accumulated, difficulties could arise as to what to do with those funds if, in fact, the organisation did not come into existence.

In the context of our position in South East Asia, it seemed that we could not afford to disregard this advice. Federal Executive felt that it was vital to ensure that the success of the Sydney Congress was built upon, and we also felt that a vigorous approach was required to turn the Region III. organisation into an actual working body.

At the outset, we ourselves were somewhat unsure of the problems involved, and felt that the best way to deal with the matter was simply to go ahead and carry out what we believed to be the intention of the Congress and the Federal Council.

At the outset, the Executive appointed myself as the W.I.A. Director, believing that this was the logical extension of my position as Federal President, at least in the somewhat difficult initial stages.

The other members of the Secretariat were Peter Williams (Secretary-General), Michael Owen, David Rankin and David Wardlaw.

I suppose that as the Region III. organisation was not in formal existence, we were really a sub-committee of Federal Executive, appointed to deal with the matter, but we felt it important to recognise the decisions of the Congress, and by calling this group the "Secretariat" we were able to preserve faith with the overseas Societies involved.

We then settled down to the long and tedious task of formulating an interim constitution. Our view that a constitution was essential was rapidly re-inforced by the refusal of the Nippon Bank to permit J.A.R.L. to remit funds out of Japan without the production of an appropriate constitution.

Our first attempt at an interim constitution failed to obtain unanimous support. (A copy of this first constitution and the covering explanatory letter was annexed to the copies of this report as submitted to Federal Councillors.) As a result of protracted correspondence, a series of amendments were formulated based on the suggestions of both I.A.R.U. Headquarters and the other member Societies involved. (These amendments were set out in a letter annexed to this report as submitted to Federal Councillors.) We believed that an interim constitution incorporating these amendments will be acceptable to all the Societies concerned, and therefore we have reprinted the interim constitution incorporating these amendments. (A copy of this re-printed constitution was also annexed to this report.) As I say, I believe that this interim constitution will be acceptable to the other Societies in the Region, and I commend it to the Federal Council for its approval. If Federal Council does so approve, I have every hope that within six weeks we shall have an interim constitution in existence that will enable the Region III. organisation to commence real operation.

There are two comments that I should make. I stress that the constitution we are presently discussing is only an interim measure to enable the Region III. organisation to come into existence. The adoption of a final constitution will be the primary task of the next Plenary. The adoption of the interim constitution has revealed widely diverging views and we must not under-rate the difficulties of resolving these divergences at the next Plenary.

The adoption of the interim constitution has involved us with much correspondence, and has, I think, brought us closer together, both with the other Societies in the Region and with I.A.R.U. Headquarters.

I have not dealt with the details of the proposals contained in the interim constitution. These are adequately set out in the material annexed to this report. This material also illustrates the vast amount of work that this task has involved.

Our aim has been to produce flexible rules but with sufficient detail on procedural matters to enable us to establish, if it ever became necessary, the procedural validity of what we have done. In considering these rules, I urge you to remember that we were bound to follow the structure as envisaged by Region III. Congress, and at the same time we had to construct rules that could adequately apply to Radio Societies in different countries with widely different legal and social backgrounds.

As a result of our experience over the past year, I believe that I can offer some views for the consideration of Federal Council. I feel strongly that the Region III. Association (as it is to be called) represents the area of the Executive's greatest achievement in the past year. I consider that the integration of this activity with the Federal Executive's other activities is essential and entirely consistent with the function of the Executive.

Our main immediate aim as a member of the Region III. organisation should be two-fold. Firstly, we must ensure that any final constitution adopted by the organisation is workable and conforms with the aims of the I.A.R.U. and the aims of the W.I.A. Secondly, we must prepare for the next Frequency Allocation Conference, using the Region III. organisation, to advance the interests of all Amateurs in all countries in the preservation of Amateur frequencies.

I believe that the Region III. organisation will remain one of the most important aspects of W.I.A. activity for at least the next five years. The decisions of the Federal Council at this Convention as to how we are to achieve our aims in this matter will be, in my opinion, vital.

(c) **Further Determinations**: Executive has submitted the following motions to Federal Council for instructions on various aspects of this section. That:—

1969/4.1: "The Federal Council ratify the action taken by the Federal Executive to date since the last Federal Convention in relation to the I.A.R.U. Region III. organisation."

1969/4.2: "The W.I.A. approves the I.A.R.U. interim constitution."

1969/4.3: "The Federal Council determine a policy in relation to the appointment of W.I.A. Region III. organisation Director."

1969/4.4: "The Federal Council approve in principle F.E. officers also holding positions on the I.A.R.U. Region III. organisation Secretariat whilst Australia is providing the same."

1969/4.5: "Federal Council direct what is to be done with any surplus collected pursuant to motion 4.1.1 of 1968 for the I.A.R.U. Region III. organisation."

Section V.—P.M.G. AND REGULATIONS

Only one motion in this section was passed at 1968 Convention:

1968/5.2.1: "That Divisions undertake to advise members of the existence of a gentlemen's agreement in relation to operating modes of c.w. and phone."

This was a motion arising from one to "request the P.M.G's Department to regulate the Amateur bands between telephony and c.w." The motion as presented was lost, and the above motion arising (5.2.1) was carried instead. No action was required of Executive by that motion.

Several matters, however, were taken by Executive to the Department, as it is Executive's policy to approach the P.M.G's Central Office on any matter which it feels may result in the granting of additional facilities to the Amateur Service, whether instructed by Federal Council or whether brought forward by one Division. So this appears an appropriate place for me to report to you generally on representation undertaken with the Department by the Institute.

Firstly, may I say that the Institute still enjoys excellent relations with the Post Office. I believe that this is because of the strength of Australia's Amateur Society, which is showing that it is viable, energetic, progressive, and, above all, **united**. If I may take this point a little further—I am very concerned that we may at times forget the ultimate objective of the "Institute" (defined as the Federal Council, Federal Executive, and the Divisions, **together**)—that is, to represent the Amateur Service, and to ensure that operating conditions and frequency allocations are as liberal as possible to ensure the continued interest in our hobby, and therefore our survival. I feel there is a danger that we may place the achievement of other objectives as of greater significance than this ultimate objective. I personally consider it is the duty of every W.I.A. officer as an ultimate objective **to preserve the W.I.A. as a viable society able to effectively represent the Australian Amateur Service**—especially to the Australian Post Office!

Shortly there may be a necessity to join in preliminary discussions pertaining to the forthcoming I.T.U. space frequency conference. We must present a strong, **united** voice at such discussions. My concern is that we may place matters out of perspective and fail to see the effect of some proposed action on the preservation of a "whole" Institute. Also I am concerned that the threat of unilateral action to achieve some immediate objective may jeopardise the unity and strength of the voice of the Amateur Service.

Following our successful Convention/Congress last year, the Postmaster-General, the Hon. A. S. Hulme, replied to my letter of thanks and said:—

"I am pleased to note your appreciation of Post Office participation in the meetings and the successful outcome of the discussions conducted, particularly those dealing with matters concerning the establishment of a Union of Region III. Amateur Societies. I wish you and the members of your Institute every success in furthering the aims and objectives of the Amateur Service."

May I ask you to ponder on the aims and objectives of the Amateur Service, the W.I.A. and W.I.A. officers. There should be no cause for things to be placed in such a poor perspective that the ultimate objectives are lost sight of!

V.H.F. REPEATERS/TRANSLATORS

During 1968, the Tasmanian Division provided Executive with a detailed case for an unattended repeater system in their State. Executive had previously been concerned with translaters in relation to Oscar/Australis experiments, and with repeaters in relation to W.I.C.E.N. activities. Some excellent material on repeater/translator systems was supplied on request from A.R.R.L. and other overseas Societies, and cases in relation to beacon transmitters were familiar to Executive.

Executive discussed the whole matter of these systems with the P.M.G's Controller Radio Branch, and the results of negotiations were publicised to Federal Council and members generally, as follows:—

"Agreement has been reached with the Department in relation to repeaters/translators as follows:

"(i.) The Department will approve the use of repeaters/translators in v.h.f. Amateur bands either on an experimental basis or on a permanent unattended installation basis.

"(ii) Such repeater or translator may either re-transmit within the same band or to another band. It is anticipated that such equipment will not be operated on frequencies below 144 Mc. though consideration may be given to their use in the 6 metre Amateur band.

"(iii) Any application (to be made to the Superintendent Radio in the State concerned) will be considered on its merits and the Department will have regard to the following points:

"(1) The number of translators permitted will be restricted to avoid undue interference in Amateur bands.

"(2) The Department will require to be satisfied that the design and construction of the particular equipment in respect of which permission to operate is sought is of a satisfactory technical standard though reasonable allowance will be made for experimental devices.

"The following additional technical points should be noted:

"(a) The equipment should include arrangements for 'fail safe' operation, i.e. failure of any component will not cause the transmitter to lock on.

"(b) The equipment shall be adequately and regularly maintained. A record shall be kept of all essential meter readings obtained during each maintenance visit, the repairs, adjustments and other maintenance undertaken and the purpose of operation (i.e. the times of

switching on and switching off of the translator).

"(c) Any form of modulation appropriate to the band in use may be employed. Where system design requirements apply, means should be provided to avoid modulation in excess of allowable limits as a function of received signal strength.

"(d) No transmission shall take place in the absence of a received carrier or if so desired, voice or other modulation intended to convey intelligence.

"(iv) The Department will have to be satisfied that a permanent installation is desired by a reasonable number of Amateurs in the area concerned.

"(v.) Net frequencies or other normally frequented band areas shall be avoided for both input and output channels of repeater/translator, except where there is general agreement among Amateurs regarding such usage.

"(vi.) The Department will have to be satisfied that the equipment is safe from unauthorised operation and can be quickly turned off in case of malfunction.

"(vii.) The site chosen must be acceptable to the Department. Transmit and receive frequencies shall be as approved by the Department. As the Amateur Service is a secondary service in bands above 144 Mc., some restriction may be necessary in regard to the use of specific channels in these bands.

"(viii.) Permission to use such equipment will be granted on a basis somewhat similar to the licensing of a radio club—namely, one individual Amateur will be nominated as being responsible for the operation of the equipment.

"(ix.) To avoid the need for repeaters/translators to be fitted with equipment for identification purposes, stations communicating through them should include in their calling procedure an indication that they are operating through a particular repeater/translator.

"It is anticipated that all State Superintendents Radio will be aware of these arrangements presently. As the implementation of these arrangements may bring to light difficulties that have been overlooked, some delays could occur.

"The Department suggests that, wherever appropriate, the local W.I.A. organisation should co-ordinate applications. It is suggested that persons seeking the use of these facilities should not hesitate to make personal contact with the appropriate officer in their State, to ensure the fullest possible mutual co-operation."

General: Once again the Institute was treated with great consideration by the Department. We feel our relations with Mr. Carroll could not be more cordial. As is obvious, numerous difficulties surround the problem of v.h.f. repeaters/translators. We feel the solution set out above is eminently reasonable.

Following the release of this information to members in "Amateur Radio," a general desire arose for a meeting to co-ordinate this new facility. A meeting was arranged, and held in Wodonga. Members from VK2, 3, 5, and 7 attended, and Divisions requested Executive's participation.

Executive members attended, acting as chairman and secretary. The meeting published detailed minutes and because the meeting had an "informal" status, Executive later circulated postal motions, based on agreements made at the Wodonga meeting:

"(A) That the following policy be adopted in relation to repeaters/translators in Amateur bands—

1. (i.) A service translator is a translator designed to be used by current mobile equipment using channels A, B and C and with the intention of extending the range of similar operation;
   (ii.) An experimental translator is a translator for experimental purposes for use by specially designed equipment and not intended to provide a use for normal operation.
2. The primary frequencies for service translators shall be 146.4 Mc. input and 145.9 Mc. output, and the secondary channel shall be 146.1 Mc. input and 145.6 Mc. output with 146.2 Mc. input and 145.7 Mc. output and 146.3 Mc. input and 145.8 Mc. output being reserved for future expansion of service translator facilities subject to prior national agreement.
3. The frequencies for experimental translators shall be 145.76 Mc. input and 147.76 Mc. output and also 420.739 Mc. input and 431.50 Mc. output.
4. All translators shall be designed for a deviation of plus or minus 15 Kc.

"(B) That the following policy be adopted in relation to net frequencies—

1. That the primary national simplex 2 metre f.m. frequency be 146.00 Mc.
2. That the primary national simplex 6 metre f.m. frequency shall be 52.525 Mc., but the 52.656 Mc. and 53.950 Mc. frequencies may be used as alternative State channels.
3. That the VK2 Division shall act as a Secretariat for the co-ordination of net frequencies including translator frequencies."

Voting on these motions has been in the affirmative by all Divisions. One point which was discussed with Executive by the VK7 Division was in relation to the status of a Secretariat. Executive has put the view that for any Institute activity involving co-ordination throughout Australia, irrespective of where the co-ordinating group or person is located in Australia, the activity should be under the control of a Federal Co-ordinator. This officer is responsible to Federal Council through Executive's Federal Activities Officer.

Executive feels that this follows established procedure—the matter has been raised by motion for the 1969 Convention.

APEX, JAYCEES AND OTHERS "ON THE AIR"

At the 1968 Federal Convention, the following motion was introduced as general business:

1968 GB3: "That the Wireless Institute of Australia co-operate as far as possible with the Apex Clubs of Australia in their suggestion regarding Amateur Radio contact with Apex Clubs in South-East Asia."

Executive was also independently approached by a representative of Jaycees for a similar reason. This matter was raised with the Department, whose attitude was made clear and firm.

It appears that in the past the Australian Red Cross Society and various other organisations have made approaches, both at a Departmental and at a Ministerial level for permission to use Amateur frequencies for similar purposes. The Department is totally opposed to such activities on Amateur bands. It feels that "Jamboree on the Air" can be justified on the basis that one of the objects of that activity is to interest young people in Amateur Radio as a hobby, and the provisions of a communications facility is only part of the total object. In the case of other organisations, the express object of the exercise is the provision of a communications facility. The Department feels that if it makes an exception in the case of one of these no doubt worthy organisations, it will find itself acutely embarrassed in relation to other applications. It therefore seems probable that any applications by Jaycees or Apex will not be successful.

OTHER MATTERS RAISED WITH P.M.G's DEPARTMENT

Several matters affecting particular Divisions were attended to by Executive during the year—including transmitter hunts and 6 metre operation in Queensland, and matters of call sign allocation. Divisions have been informed of results of Executive's representations.

I.T.U. CONFERENCE FOR SPACE TELECOMMUNICATIONS

This is scheduled to be held at Geneva in late 1970 or early 1971. Executive has written to the Postmaster-General advising that if an Australian co-ordinating committee is formed similar to the committee prior to previous I.T.U. Conferences involving frequency assignments, our representative would be I.T.U. Liaison Officer, VK3VX.

In writing to the Postmaster-General, Executive stated that with the Amateur Service holding various assignments within the v.h.f.-s.h.f. range, it is essential that our I.T.U. representative be given the opportunity for a hearing.

The Postmaster-General has replied to the effect that the Post Office will make all preparations required for this Conference. In so doing, it will co-ordinate proposals originating from sources within Australia, and co-opt for discussion as required representatives of services likely to be affected by such proposals and those of other countries which are to receive consideration at Geneva. W.I.A. I.T.U. representative VK3VX will be supplied with a copy of proposals which may affect the Amateur Service when they are available.

Executive has submitted to I.A.R.U. Headquarters details of v.h.f.-s.h.f. activity in Australia, as requested.

Future Determinations: Quite a large number of motions in this section is before Federal Council for its discussion. Undoubtedly Executive will be requested to approach the Post Office on some or all of these matters, or may be requested to represent Amateurs or Divisions from time to time throughout the forthcoming year. In any case, Executive will continue to comply with Institute policy item P.02 of 1951:

"That any facilities granted by the Postmaster-General are not refused by the W.I.A."

Section VI.—CONTESTS AND AWARDS

These activities are administered by Executive through Federal Activities Officer on behalf of Federal Council. Council directives from Convention are acted upon by the co-ordinator appointed by Executive, and so are usually the subject of report annually to Federal Council, and therefore I will not report on contests or awards.

However, I wish to say a sincere thank you to those who so ably look after our contests and awards—the many hours of checking and recording are very much appreciated.

Section VII.—GENERAL MATTERS

Motion 1968/6.6: "That the Wireless Institute of Australia in a form appropriate to Amateur Radio publicise the anniversary of the arrival of Captain James Cook in Australia 1770-1970."

Executive has some suggestions as to the implementation of this motion, but as a formal motion requesting a report on progress made is before Convention, the matter will be deferred until the Convention.

1970 also co-incides with the 60th anniversary of the Institute, commemoration of which is a matter before 1969 Convention for discussion.

Perhaps both can be suitably commemorated at the same time? Executive will await Federal Council's instructions on these and other commemorative matters.

Motion 1968/GB1: "That the appropriate authority be approached for approval to mint a 5 cent stamp to commemorate the launching of the first Australian Amateur satellite—the Australis I.—and that the W.I.A's sponsorship of the project be recognised therein."

Past Federal President investigated the matter of commemorative stamps and reported that a commemorative postage stamp depicting Amateur Radio could be possible if a strong application were made soon enough. He was advised that any appliaction would be enhanced if it could include a celebration date or something of that nature. Procedures for applying were outlined, and it was indicated that the authorities work in advance on a two-year programme. However, as there is little likelihood of any launch of Australis or other Amateur satellite in the near future, according to reports received by Executive, we feel that no further action on this motion is possible. However, Executive now is in a position to advise Federal Council on future commemorative stamp issues.

Motion 1968/GB2: "That because of the overstatement of expenses of the Federal Convention held in Brisbane in 1966, in future statements of receipts and expenses relating to Federal Conventions, the detail of expenses be limited to costs relating directly to the Conventions and incurred only on behalf of Federal Executive and Councillors, and do not include expenses incurred by Divisional observers and others which are directly refunded by Divisions or others."

In accord with instructions contained in this motion, Executive provided Federal Treasurer and Institute Auditor with a detailed breakdown of 1968 Convention/Congress expenses. This will be a matter of report by the Federal Treasurer, but Executive wishes to state that the expenses of the inaugural Region III. Congress were met from funds accumulated as a result of overseas publications distribution by Executive to W.I.A. members.

The granting of commission to Amateur Societies for handling their publications was an act of deliberate policy by A.R.L. Board of Directors. Executive believed that it was well spent in a way designed to advance Amateur Radio in this Region, and was pleased that no burden fell on W.I.A. members, by way of per capita recovery, for the Region III. Congress.

Miscellaneous Motions:

1968/7.1: "That the term Hertz and its associated terminology be used in Institute publications at the discretion of the Publications Committee."

This matter was referred to the Publcations Committee, who, at their discretion, appear not to be using the hertzian terminology. No action is required of Executive.

1968/GB4: "That Federal Executive report on the present position with regard to supply of the brochure 'How Can I Become a Radio Amateur,' and endeavour to arrange for early delivery to Divisions."

At a recent Executive meeting, Past Federal President tabled an up-dated draft of this booklet. On examination by Executive, there still appears to be a few additions required. The delivery date to Divisions is still indeterminate.

1968/GB5: "That Federal Council recommends to Federal Executive the appointment of Mr. Jim Webster, VK2ZCW, as Federal Co-ordin-

ator of the Wireless Institute of Australia Youth Radio Scheme."

Executive has acted in accordance with this Federal Council recommendation.

1968/GB7: "That the Divisions agree on a common form of application for membership for inclusion in the Institute's publication."

Divisions have provided information to the Publications Committee who published an insert to "Amateur Radio" for March to accompany a Federal Comment. Some Divisions have commented favourably on the effect this has had on membership applications.

1967/GB6: "That the W.I.A. encourage members to meet foreign students in Australia, and invite them to visit Amateur Radio installations while QSOs with Amateurs in the student's home countries are in progress."

Executive has been unable to take any action in regard to this motion during the past year.

Resolution: "That a review of the Policy Book be not undertaken at Convention, but that Federal Councillors peruse the Policy Book during the year and communicate any suggestions to Federal Secretary."

Executive has received no suggestions during the past year from Federal Councillors in relation to the Policy Book. Some motions before 1969 Federal Convention may require subsequent amendments to the Policy Book.

Venue of 1969 Convention: Extract from 1968 Minutes of Federal Convention:

"During discussion, VK6 invited Federal Council to come to Perth in 1969.

"VK2 referred to the cost of Conventions in VK6, and the fact that the last one was subsidised by the VK6 Division.

"Federal Secretary suggested that Federal Executive and the VK6 Federal Councillor examine the aspect of the cost of a projected Convention in Perth and report to Federal Council.

"Resolved to that effect, with tentative agreement that VK6 be the next venue—depending on Executive's report on costs."

Executive discussed the matter with VK6 Federal Councillor, and in order to effectively report to Federal Council, felt it would be relevant to consider an alternative to Perth. Accordingly, an initial unofficial approach was made to members of the Canberra Radio Club to provide some facts which could be placed before Federal Council giving an alternative venue to Perth.

A budget of costs for a Convention in Perth, as compared with a Convention in Canberra, was provided to Divisions in accord with policy item E01. Approval for Canberra as a Convention venue was received from all States.

The Constitution and Policy Book are silent on methods of determining Federal Convention venue—it is customarily held in Divisions in rotation and by invitation; however, the matter has been brought forward for discussion by Federal Council.

Membership: At the time of writing this report, membership figures are incomplete. The returns from VK6 and VK7 have been regular, but from other Divisions they are somewhat erratic. Executive would appreciate it if a report on February membership from each Division could be submitted at Canberra. Licensed Amateurs in VK totalled 5792 in December 1968.

Notable Achievements: It may be of interest to members to learn of some notable Amateur activity in the v.h.f.-s.h.f. range, carried out recently in N.S.W. and Queensland, on 1296 Mc.

On 29th December, 1968, VK2ZCF/2 worked VK2ZAH over a 65-mile path. This bettered the existing Australian record by about 18 miles. On the same day, VK4TE worked VK4KE/4 over 53 miles which also bettered the previous record.

On 5th January, 1969, VK2ZCF/2 worked VK2ZAC—71 miles—and VK4KE/4 worked VK4ZT/4 over 112 miles. Finally, on 2nd February, 1969, VK4KE/4 and VK4ZT/4 made two-way contact over a 138-mile path and this last mentioned contact will become the Australian record.

Personal Contact: During the year, some opportunities for personal contact between Federal and Divisional officers occurred. The VK3 Federal Councillor visited VK5 and New Zealand, and met with VK5 officers and also N.Z.A.R.T. officers. VK5 Federal Councillor visited Victoria and met with members of Executive and VK3 officers. VK2 and VK7 Councillors and some members met with members of Executive, and the VK3 Federal Councillor, at a Christmas Party arranged by Federal Secretary's XYL. Federal President and Vice-President were invited by VK7 Council to visit Tasmania and discuss Federal problems with them. Federal President and his XYL were the guests of the VK2 Division at their annual Convention dinner recently. At the Wodonga repeater conference, personal meetings between VK2, 3, 5 and 7 officers and members of Executive occurred.

These and many other opportunities for personal contact were taken by Executive, as we feel that often problems arise in our organisation through "breakdown of communications" between people.

Executive has placed before Federal Council for discussion and direction, the matter of N.Z.A.R.T's invitation extended to W.I.A. Federal President to attend their Gisborne Convention in May 1969. Executive believes that it should seize all opportunities to visit Divisions and other countries, if invited.

Oscar-Australis Satellites: No report has been received from the group undertaking these activities. However, we are informed by I.A.R.U. Headquarters that the general situation is best described as confused, and getting an Amateur satellite launched is not as easy as it was. There appears to be vigorous discussion on the future among the Oscar group, and it is reported that a new group in the East Coast area has formed a body similar to the Oscar body with basically the same aims. This new group will probably work closely with N.A.S.A., but things generally in U.S.A. are unsettled.

As Australia would rely on the provision of launch vehicles by U.S.A., the position in this country is therefore indeterminate.

Section VIII.—CONCLUSION

In concluding this review of the past year, I am aware that a number of errors of judgment may have been made. We, as Executive, must also concede that in respect of other matters we may not have always done things in a way that would be acceptable to all of you. Yet, overall, we believe that Executive has performed an important role in the affairs of our Institute, and has contributed to the advancement of Amateur Radio both within Australia and internationally.

(Continued on Page 26)

WIRELESS INSTITUTE OF AUSTRALIA—FEDERAL EXECUTIVE

STATEMENT OF INCOME AND EXPENDITURE for Year ended 28th February, 1969

1967/68			1968/69
	INCOME:		
$215	Interest received		$239.46
1,157	State Contributions—per Capita		1,223.70
317	Surplus Publication, Badges		485.27
—	Refund Expenses, Youth Radio Scheme		47.38
$1,689			$1,995.81
	EXPENDITURE:		
$32	Audit Fees	$31.50	
133	Depreciation	154.00	
—	R.D. Contest	6.50	
52	Awards Committee	10.90	
41	QSL Bureau	40.00	
34	Contests Committee	28.01	
39	Maintenance, Office Equipment	20.30	
10	Floral Tributes	8.00	
2	P.M.G. Licence	2.00	
—	I.A.R.U. Expenses	75.00	
108	Travelling Expenses	87.60	
203	General Expenses	82.37	
507	Stationery, Postage, Telephone	404.31	
303	Salaries	579.10	
16	Insurance	27.90	
8	Interest, I.T.U. Fund	317.77	
18	Y.R.S.	—	
115	Australis	—	
44	Badges	—	
30	Subscriptions	—	
$1,695			1,875.26
		Surplus for Year	$120.55
$6	Deficit		

REGION III. I.A.R.U. CONGRESS 1968

Fares	$52.00
Accommodation	381.34
Dinner	218.75
Other Meals	184.71
General Expenses	128.09
Transferred to Accumulated Funds	$964.89

BALANCE SHEET as at 28th February, 1969

1967/68			1968/69
	CURRENT ASSETS:		
	Commonwealth Trading Bank—		
$7,652	Federal Executive	$1,467.84	
987	Publications	381.98	
—	I.T.U. Fund	6,306.45	
263	Sundry Debtors	834.88	
442	Stock on hand—at lower of cost or market value	325.11	
49	Prepayments	131.34	
$9,393			$9,447.60
	FIXED ASSETS:		
$1,133	Furniture, Fittings and Equipment at cost less depreciation		1,213.27
$10,526	TOTAL ASSETS		$10,660.87
	Less		
	CURRENT LIABILITIES:		
752	Reserve Fund	$752.00	
5,414	I.T.U.	6,306.45	
—	Sundry Creditors	87.60	
$6,166			7,146.05
	ACCUMULATED FUNDS:		
$4,366	Balance, 1st March, 1968	$4,359.16	
—7	Add Surplus for year	120.55	
		$4,479.71	
	Less Region III. Congress	964.89	
$4,359			$3,514.82

AUDITORS' REPORT

We have examined the books and vouchers of the Wireless Institute of Australia (Federal Executive) for the year ended 28th February, 1969. In our opinion the accompanying Balance Sheet is properly drawn up so as to give a true and fair view of the state of the affairs of the Federal Executive as at 28th February, 1969, and the attached Statement of Income and Expenditure is properly drawn up so as to give a true and fair view of the results for the year ended 28th February, 1969.

Melbourne,
14th March, 1969

Hebard and Gunning,
Public Accountants

Book Review

WORKING WITH OSCILLOSCOPE

By C. W. Saunders

This rather large book of 104 pages measuring 11 x 8½ in., devotes more than half the available space to diagrams and circuits. It is this reviewer's opinion that the drawings are unnecessarily large and it is difficult to accept the somewhat unconventional style, although it must be admitted it is very distinct.

The first 32 pages are devoted to what are called lessons. These lessons outline the theory and operation on the oscilloscope, oscillographic patterns, time base oscillators, vacuum tube time base generators and vertical deflection amplifiers. The remainder of the book comprises 26 projects, enabling the reader to apply the oscilloscope to practical experiments using the oscilloscope as a test instrument in a large variety of applications. The text is liberally supplied with illustrations of the types of trace to be expected under various condtions.

TAB Book No. 472. Price $US4.95.

THE TYPE 111D IONOSONDE

By L. I. McGarry and S. M. Campbell

It may be recalled that the purpose of this series is to make available information about aspects of the work of the Ionospheric Prediction Service Division, Bureau of Meterology, which may be of some interest but would not normally be published in any scientific or technical journals.

The Australian Ionospheric Prediction Service uses vertical incidence ionospheric sounders to obtain data for prediction and research purposes. One such sounder, the Type 111D ionosonde, was designed and built by the Prediction Service. This report gives a technical description of the methods used to sound the ionosphere and record the results on 35 mm. film. The report is illustrated with block diagrams and drawings.

Our copy from Ionospheric Prediction Service Division, Commonwealth Centre, Chifley Square, Sydney.

SEMICONDUCTORS: FROM A TO Z

By Phillip Dahlen

This book proved to be an extremely interesting and informative publication. The 26 chapters, spread over 272 pages with over 300 illustrations, gives a wealth of information on the range of transistors and semiconductors in use today—from basic diodes and transistors to FETs, MOS-FETs, tunnel diodes, integrated circuits, varicaps, photo FETs, light sensitive and light-emissive devices, unijunction transistors, field-effect diodes, SCR and zener diodes, etc. It explains how these various devices work and how they are used, with complete descriptions of all the common and unique circuits used in modern semiconductor technology.

The content begins with a review of how basic semiconductors work, including types and function, how a transistor conveys a signal biasing techniques, effects of temperature, factors limiting frequency response, etc. Succeeding chapters delve into the arena of field-effect transistors by explaining the differences between FETs and regular transistors, junction FET applications, frequency response, temperature effects and depletion and enhancement type MOS-FETs.

Considerable attention is given to integrated circuit applications. The use of varicaps is also covered, as well as unijunction transistors, field-effect diodes, zener diodes, diacs, and triacs, etc.

TAB Book No. 493. The price quoted is $US7.95 hardbound or $US4.95 paperbound. We are given to understand that TAB books are available from Robertson & Mullins in Melbourne.

SILENT KEY

It is with deep regret that we record the passing of the following Amateur:

VK3AOM—George W. Baty.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

REMEMBRANCE DAY CONTEST

Editor "A.R.," Dear Sir,

Now that the results of the 1967 Remembrance Day Contest have been published, also the new Call Book, the writer has conducted a detailed investigation into the R.D. Contest rules to try and find a solution to make the contest a better one for all Amateurs, yet keeping to the expressed intention of the contest.

First of all it comes as a shock to find that the R.D. Contest, in its present form, is not a very democratic contest because approximately 200 licensed Amateurs cannot take part **fully** in the contest if they wish to do so.

The writer has very carefully examined the 1967 R.D. Contest rules published in "Amateur Radio," July 1968, the Editorial by VK3QV and the article by VK3TX in the August 1968 issue.

The rules commence, "A perpetual trophy is awarded annually for competition between Divisions . . ." Further on the rules state: "VK1 scores will not be included with VK2, nor VK8 with VK5," but in the Receiving Section: "VK1/VK2 and VK5/VK8 are considered to be the same area for scoring purposes."

The Call Book, page 56, shows that there are only six Divisions—being New South Wales, Victoria, Queensland, South Australia, Western Australia and Tasmania.

Now for the purpose of Commonwealth administration, Australia and its Territories are divided into 10 call-sign areas, and to make matters more complex, in some areas the call sign carries a different numeral to other call signs in the same political area, i.e. areas under the same **State** Government.

For instance, while Lord Howe Island carries the prefix VK2, being part of N.S.W., Macquarie Island carries the prefix VK0, although it comes under Tasmanian State jurisdiction. (Those living on Macquarie Island are entitled to vote in Tasmanian municipal elections, being considered Taswegians.)

I am not sufficiently familiar with the internal administration of the W.I.A. to know if VK1 is part of the N.S.W. Division, and so on, but it is obvious from the rules that transmitting Amateurs in VK1, VK8, VK9 and VK0 (except where their domicile is in a particular State) cannot compete **fully** in the R.D. Contest.

My solution to this problem, therefore, is to create another Division to be known as the Territories Division, in which all Amateurs in any Australian Commonwealth Territory would be included. The Call Book shows that there are about 200 such Amateurs.

It might be thought that administration of such a Division could be difficult, but the I.A.R.U. operates on a world-wide basis and I have no doubt that a really active Divisional Committee could make such a Division workable. Space does not permit going into details.

The second portion of the solution to the R.D. Contest problem is to include the registered W.I.A. S.w.l. members in his or her own Division's logs. (VK1, VK8, VK9 and VK0 where applicable in the proposed Territories Division.)

Lastly, it is necessary to revise the formula and I propose the following:

Average of top 12 transmitting logs plus average of top 6 receiving logs plus (Divisional logs entered divided by Divisional licences, multiplied by total points from all entrants).

I believe that these suggestions would allow all transmitting and s.w.l. Amateurs to participate to the fullest extent in the contest and make it more equitable between Divisions. It will be noticed that in the formula the word State has been replaced with the word Division, since the contest is not between States but between Divisions.

This proposal means that each transmitting Amateur and each W.I.A. registered S.w.l. has his individual score assisting his Division, whereas at present the scores of VK1 and VK8 transmitting Amateurs are excluded by the rules, whilst VK8, VK9 and VK0 apparently cannot be included in present formula as they are not Divisions as required in the first part of the rules. No doubt the poor response from VK1, VK8, VK9 and VK0 can be attributed mainly to this factor as this exclusion does not contribute to great enthusiasm for the R.D. Contest in these call areas.

I firmly believe that this proposal is the most democratic so far proposed although it cannot overcome the apathy in the R.D. Contest which appears to exist in some Divisions to a greater extent than in others.

—C. A. Cullinan, VK3AXU.

S.W.L. PARTICIPATION IN VK CONTEST

Editor "A.R.," Dear Sir,

After reading Mr. Trebilcock's letter in the July 1968 "A.R.," I decided then and there that I would participate in the VK/ZL/Oceania DX Contest despite the fact that at this time I had had my Lafayette HA230 only four months and my countries heard tally was about 25.

I participated, listened for a total of 12 hours, and heard 100 stations for 4575 points, and sent in my entry. I was surprised and pleased to receive a certificate. However, the discovery that only ten VK listeners sent in an entry bitterly disappointed me.

Overseas listeners sent in entries with scores like 48, 24, 12 (UP20388, UC20081 and HA5153 respectively). Much as I would hate to kill the ZL Contest Manager with work, I think it would help the spirit of the contest if even low-scoring listeners entered.

I may be forty years younger than Eric Trebilcock, but I wholeheartedly sympathise with his feelings as expressed in his letter.

—Colin Kilduff, WIA-L2342.

DEFINITE SUNSPOT NUMBERS FOR 1968

By M. Waldmeier, Eidgenossische Sternwarte, Zurich, Switzerland.

D.	Ja.	Fe.	Mr.	Ap.	My.	Jn.	Jl.	Ag.	Sp.	Oc.	No.	De.
1	119	208	108	122	126	139	55	98	78	75	89	104
2	123	211	110	108	144	134	37	91	82	73	76	109
3	128	199	92	98	143	121	30	92	119	108	76	113
4	137	170	86	96	138	114	26	94	118	119	81	116
5	152	137	77	89	127	115	28	94	111	118	97	118
6	150	114	67	85	142	129	41	95	96	126	92	117
7	164	86	58	79	135	138	54	100	90	135	92	116
8	182	97	67	82	128	119	89	113	106	112	89	122
9	200	95	65	94	122	103	91	98	128	87	105	130
10	198	92	74	104	117	99	99	90	138	70	111	117
11	154	89	85	95	106	87	124	104	145	95	106	101
12	144	76	87	83	82	105	152	116	150	99	94	68
13	139	67	89	60	91	108	147	142	153	70	94	75
14	107	69	67	96	80	114	138	165	113	76	85	81
15	94	87	59	110	95	107	123	172	88	90	84	84
16	78	85	46	114	103	103	129	170	84	88	84	67
17	68	94	59	91	114	113	117	160	81	82	82	77
18	60	78	59	63	136	121	96	148	85	108	77	93
19	58	65	53	53	138	107	102	136	88	112	80	101
20	55	72	60	63	140	103	93	122	84	114	92	102
21	55	79	70	64	142	108	93	138	90	122	84	107
22	69	82	91	68	143	94	86	143	99	134	81	114
23	75	93	113	50	149	101	93	126	118	136	76	114
24	93	119	132	48	165	113	101	108	149	139	67	125
25	90	161	143	64	146	111	124	86	187	138	80	131
26	87	150	141	50	121	107	130	77	184	133	89	140
27	88	126	146	57	139	102	127	67	176	138	87	148
28	140	124	138	82	133	111	118	49	149	118	73	139
29	175	120	127	71	135	94	129	64	137	114	73	139
30	185		154	96	126	88	115	68	91	112	83	119
31	209		134		136		93	63		99		117

Mean: Jan. 121.8, Feb. 111.9, Mar. 92.2, Apr. 81.2, May 127.2, June 110.3, July 96.1, Aug. 109.3, Sep. 117.2, Oct. 107.7, Nov. 86.0 Dec. 109.8. Yearly Mean equals 105.9.

FINAL SMOOTHED SUNSPOT NUMBERS

July 1967	94.2
August 1967	95.4
September 1967	95.3
October 1967	95.0
November 1967	97.1
December 1967	100.6
January 1968	102.6
February 1968	102.9
March 1968	104.6
April 1968	107.2
May 1968	107.6
June 1968	106.6

Mean equals 100.8.

Commonwealth of Australia Ionospheric Prediction Service.

NEW CALL SIGNS

NOVEMBER 1968

VK2FX—F. W. Nairn, 2/25 Delmar Pde., Gladesville, 2111.
VK2AGV—G. M. Dowse, 18 Davidson Ave., Woonona, 2517.
VK2AVV—Penrith High School Radio Club, Station: Penrith High School; Postal: 80 Great Western H'way, Springwood, 2777.
VK2BJC—J. Chessell, 2 Esplan Court, The Esplanade, Ashfield, 2131.
VK2ZGT—D. K. W. Bradbury, "Karana," Derriwong, 2745.
VK2ZJA—I. B. Bowmaker, 15 Akuna St., Keiraville, 2500.
VK2ZJI—J. F. Davis, R.A.A.F. Base, Richmond, 2753.
VK2ZKI—J. Thomas, 81 Hanbury St., Wentworthville South, 2145.
VK2ZKV—K. J. Cox, Sturt H'way, Forest Hill, via Wagga Wagga, 2650.
VK2ZLA—J. L. M. Andrews, 49 Lord St., Roseville, 2069.
VK2ZML—R. J. Mansfield, 33 Bundarra Rd., Bellevue Hill, 2023.
VK2ZNC/T—N. A. Dunn, 6 Pat Hargraves Pl., Maroubra, 2035.
VK2ZPX—P. W. Walton, Station: 99 Hardinge St., Deniliquin; Postal: P.O. Box 267, Deniliquin, 2710.
VK2ZSS—S. F. Wilson, Unit 2, 76 Laudendale Ave., Fairlight, 2094.
VK2ZZM—B. K. Boardman, 108 Chelmsford Ave., East Lindfield, 2070.
VK3BR/T—R. B. Russell, 1 Cedar Crt., Forest Hill, 3131.
VK3ACT/T—B. J. Lakey, 32 Giles St., Mirboo North, 3871.
VK3AEI—R. A. Hipwell, 57 Pier St., Dromana, 3936.
VK3AKQ—K. J. Echberg, Lot 10, Bahama Crt., Vermont, 3133.
VK3AOZ—G. O. W. Niele, 14 Elaine Crt., Springvale, 3171.
VK3ZDB—J. M. Shaw, Myrrnee, Wangaratta, 3732.
VK3ZEW—P. A. Stroude, Lot 38, Shelley Ave., Bayswater, 3153.
VK3ZOG—P. G. M. Bruer, Flat 11, 65 Tivoli Rd., South Yarra, 3041.
VK3ZPT—F. H. Birkbeck, 35 Richmond St., South Blackburn, 3130.
VK4AE—J. D. Elshoff, Station: 351 Rode Rd., Chermside, 4032; Postal: 394 Rode Rd., Chermside, 4032.
VK4DY—A. J. Chappel, D'Aguilar, 4513.
VK4HO—C. Churm, 1 Rolland St., North Ward, Townsville, 4810.
VK4IS—A. L. Stehn, 210 Alma St., Rockhampton, 4700.
VK4KC—G. J. Griffiths, 1 New St., Nerang, 4211.
VK4MU—T. W. Marks, 22 Renita St., Aspley, 4034.
VK4NO—E. T. Norris, 210 Hume St., Toowoomba, 4350.
VK4OB—Rockhampton District Boy Scouts' Radio Club, Station: Seeonee Park, Rockhampton, 4700; Postal: Fitzroy St., Rockhampton, 4700.
VK4OQ—P. J. Murdoch, 29 Sixth Ave., Palm Beach, 4221.
VK4QP—J. R. Godson, 35 Charles St., Gladstone, 4680.
VK4TK—I. H. Campbell, 31 Kamarin St., Manly, 4179.
VK4ZPM—P. J. Weir-Smith, MQ27, Borneo Barracks, Cabarlah, 4350.
VK4ZTR—T. Connolly, 28 Birubi St., Coorparoo, 4151.
VK4ZTS—G. T. Schott, Woondi Rd., Bell, 4408.
VK5EI—W. E. Dixon, 18 Mosterton Rd., Elizabeth Park, 5113.
VK5ZAG—E. W. Deakin, 109 French Tce., Port Pirie, 5540.
VK5ZAH—P. R. Parise, 53 Enterprise Rd., Elizabeth East, 5112.
VK5ZBU—H. J. Button, 10 Price Ave., Klemzig, 5087.
VK5ZCE—R. J. Sieber, 238 Victoria Tce., Hawthorn, 5062.
VK5ZCK—R. L. Reseck, 8 North Pde., Kingswood, 5062.
VK5ZCQ—J. A. McLachlan, 7 Austral Tce., Morphettville, 5043.
VK5ZSL—P. Lawson, 1 Doreen St., Prospect, 5082.
VK6ZDZ—A. P. Legg, C/o. Morris Hotel, Innaloo, 6018.
VK6ZEQ—A. W. Pike, 6 Latham St., Alfred Cove, 6154.
VK6ZFJ—S. J. Thornett, 1196 Acanthus Rd., Riverton, 6155.
VK8AF—J. S. Sisson, Station: 4417 Bulbul St., Ludmilla, Darwin, 5790; Postal: Box 2457, Darwin, 5794.
VK8AZ—B. Gardiner, 2012 Young Cres., Alawa, Darwin, 5790.
VK8PB—A. D'Arcey, 1950 Trower Rd., Alawa, Darwin, 5790.
VK8ZKA—P. M. Van der Velden, Flat 1, 2332 Austin Lane, Darwin, 5790.
VK9DH—D. G. Hallam, Station: Cassia Cres., Section 41, Lot 51, Lae, N.G.; Postal: C/o. O.T.C., Box 251, Lae, N.G.
VK9LA—Lae Amateur Radio Club, Station: Bugandi High School, Markham Rd., Lae, N.G.; Postal: C/o. Hon. Secretary, P.O. Box 799, Lae, N.G.

CANCELLATIONS

VK2AUW—P. R. Crosthwaite. Not renewed.
VK2BGG—G. J. Griffiths. Now VK4KC.
VK2BIH—J. H. Thompson. Not renewed.
VK2BMG—G. M. Browning. Not renewed.
VK2BWR—W. R. Rindone. Not renewed.
VK2ZGL—P. C. Kloppenburg. Transferred Interstate.
VK3RG/T—R. B. Russell. Now VK3BR/T.
VK3VO—R. J. Clark. Deceased.
VK3ACO—St. Annes Science Club C.E.G.S., Sale. Ceased operation.
VK3ZQC—B. J. Lakey. Now VK3ACT/T.
VK3ZXS—P. A. Stroude. Now VK3ZEW.
VK4AD—A. D'Arcey. Now VK8PB.
VK4BT—N. W. Atkinson. Not renewed.
VK4ZCA—A. J. Chappel. Now VK4DY.
VK4ZCI—I. H. Campbell. Now VK4TK.
VK4ZCK—R. W. J. Hazell. Transferred New South Wales.
VK4ZCL—C. C. Bunn. Ceased operation.
VK4ZET—E. T. Norris. Now VK4NO.
VK4ZLS—A. L. Stehn. Now VK4IS.
VK5DI—W. T. Lucas. Not renewed.
VK5NC—K. G. Ellis. Ceased operation.
VK5ZEA—I. C. Batty. Not renewed.
VK5ZET—E. R. Tuohy. Not renewed.
VK8ZEC—P. M. Van der Velden. Now VK8ZKA.
VK9JM—J. P. Meehan. Transferred to N.S.W.
VK0AL—A. Nickols. Left Antarctica.
VK0IA—D. P. James. Left Antarctica.
VK0JW—J. G. Kaarsberg. Left Antarctica.
VK0VK—V. J. Kitney. Left Antarctica.

DECEMBER 1968

VK1AD—G. M. Brown, Station: 5 Palmer St., Garran, 2605; Postal: P.O. Box 183, Manuka, 2603.
VK1LF—L. B. Fisher, 7 Elder St., Braddon, 2601.
VK1ZJH—J. Hyne, Station: 12 Perkins Pl., Torrens, 2607; Postal: P.O. Box 1271, Canberra City, 2601.
VK2ADE—F. N. Leverrier, 21 Allambie Rd., Castle Cove, 2069.
VK2AGJ—C. P. Daw, "Woodlands," Wombat, 2595.
VK2BAV—Cowra High School Radio Club, 6 Walker St., Cowra, 2794.
VK2BEW—E. A. Woodbridge, 2 Dorman Cres., Lindfield, 2070.
VK2BRU—S. A. Brunette, 51 Ilford Ave., Buttaba Heights, via Rathmines, 2283.
VK2BVR—V. A. Rochfort, 1 Hemingway Cres., Fairfield, 2165.
VK2ZDZ—D. J. Williamson, 16 Market St., Bankstown, 2200.
VK2ZFH—A. C. Counsell, 11 Allandale St., Beresfield, 2322.
VK2ZSV—B. S. Stevenson, 21 Glendower Ave., Eastwood, 2122.
VK2ZZQ—P. J. Wait, 25 Strathlora St., Strathfield, 2135.
VK3AZ—J. D. Lundy, 90 Dalny Rd., Murrumbeena, 3163.
VK5CW—P. A. Dennison, Station: 44 Johnstone Rd., Oaklands Park, 5046; Postal: Dept. of Physics, University of Adelaide, Adelaide, 5000.
VK5DZ—M. J. Groth, 75 Charles St., Prospect, 5082.
VK5PA—P. A. Matthews, 11 Gurr St., Goodwood, 5034.
VK5QG—G. E. Southgate, 203 Wright Rd., Valley View, 5093.
VK5ZCT—R. J. Cunningham, 59 Teusner Dr., Morphett Vale, 5162.
VK6FR—R. F. Frost, C/o. N.A.S.A. Space Tracking Station, Carnarvon, 6701.
VK6GT—G. J. Bedwell, 43 Pandora Dr., City Beach, 6015.
VK6WX—W. G. Garton, 5 "Santa Barbara", Hastings St., Scarborough, 6019.
VK6ZGH—C. P. Cearns, Station: Carnarvon; Postal: P.O. Box 98, Carnarvon, 6701.
VK7RR—B. J. Morgan, 110 Hampden Rd., Hobart, 7000.
VK7TC—Hobart Teachers' College Electronics Club, 2 Edward St., Glebe, 7000.
VK7ZCD—C. A. Danforth, 9A Philosopher St., Savage River, 7321.
VK8DA—Darwin Radio Club Incorporated, Station: 1 Kerin Pl., Rapid Creek, 5792; Postal: P.O. Box 1897, Darwin, 5794.
VK9KY—K. Yun-Hung Young, C/o. Ionospheric Prediction Service Station, P.O. Box 31, **Cocos (Keeling) Island, Indian Ocean.**

CANCELLATIONS

VK2HI—A. H. Brodrick. Transferred to N.T.
VK2JK—J. S. Vardy. Not renewed.
VK2WO—H. F. Owen. Not renewed.
VK2BLF—L. B. Fisher. Now VK1LF.
VK2BRF—R. C. Frosberg. Not renewed.
VK2ZAF/T—J. L. Harrison. Transferred to W.A.
VK2ZQM—G. V. Comber. Not renewed.
VK2ZSB—S. A. Brunette. Now VK2BRU.
VK3AZ—A. E. Avard. Not renewed.
VK3MK—J. D. Lundy. Now VK3AZ.
VK3AYH—E. A. Hayward. Not renewed.
VK5SL—N. L. Sjoberg. Ceased operation.
VK5ZBB—R. J. Langdon. Transferred to N.S.W.
VK5ZBH—M. R. Haskard. Ceased operation.
VK5ZDH—R. A. Jackson. Ceased operation.
VK5ZMG—M. J. Groth. Now VK5DZ.
VK5ZPM—P. A. Matthews. Now VK5PA.
VK6GD—H. R. Geldard. Deceased.
VK6ZEF—R. F. Frost. Now VK6FR.

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W.I.A. ANNUAL REPORT

(Continued from Page 24)

One feature of the year under review has been the stringent criticism the Executive has received from one Division. I do not believe that that criticism has on all occasions been unjustified, neither do I consider that we have received any generosity or understanding from that Division. The effect has been to divert much time and energy from productive activities to the, at times, seemingly interminable disputes. Another effect has been to magnify small matters to an importance they do not justify.

So, for the forthcoming year, we seek the consideration and understanding of all the Divisions. To expect the best from honorary officers subject to the unremitting pressure of the past year is unrealistic. There must be occasions when there is a legitimate and justified difference of view between a Division and the Executive, as there must be between Division and Division.

To resolve these differences, to reach agreements, to advise Executive in the execution of these agreements is the purpose of a Federal Convention. Except in the most unusual case, these cannot be satisfactorily resolved by the unilateral exercise of non-constitutional power by one Division.

Likewise, it should be remembered that at times when information is sought, the Executive will, in respect of the matter, not have completed its task. To demand that the Executive justify what it has only half done is not to exercise restraint and is unrealistic.

In the forthcoming year, then, let us all try to avoid a repeat of the past year; let us all exercise some tolerance and understanding and also above all, remember that in most cases there is room for two quite legitimate but different views on the same subject, but proper procedures exist whereby one part of the Institute can attempt to convince the Institute as a whole of the worth of its views. So Executive seeks the personal support of each Federal Councillor, who above all we believe should not engage in actions that are, whether justified or not, destructive of the Institute as a whole. We also hope that **all** parties to the Federal organisation will subvert their personal, divisional, or other unique viewpoints in the interests of the Institute as a whole, and allow the Institute as a whole to use its established procedures to determine for itself what is in the best interests of the "Institute". There is only one Institute—we are all but parts of it. No one part of the W.I.A. is greater than the W.I.A.!

In summary, gentlemen, I believe that this Executive has generally acted vigorously and competently as the Executive body of the Institute over the past year. In spite of difficulties, much has been achieved. However, we do not feel that we have always been given a "fair go"!

—JOHN B. BATTRICK, VK3OR,
Federal President, W.I.A.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

VHF

Sub-Editor: CYRIL MAUDE, VK3ZCK
2 Clarendon St., Avondale Heights, Vic., 3034

Since the last issue went to print the VK6 two metre beacons have been heard on at least three occasions, but as yet no VK3 Amateur has been able to work the elusive VK6 on two metres, but it is reliably reported that VK5s have worked into Perth.

Other news is that Ray VK3ATN's two metre moonbounce record has been broken by a ZL1 and a SM7; the VK3 V.h.f. Group has a new committee; and at the time of typing these notes, the W.I.A. Federal Councillors are fighting it out at Canberra.

Hope to have more news for you next month. 73, Cyril VK3ZCK.

BEACONS

Addenda to the March 1969 list supplied by Brian VK5TN:

VK6VF/P—Albany, 144.500. VK6VF—Perth, 145.02 Mc.
VK5VF Adelaide, 144.800 and 53.000 Mc.
ZE1JZA Rhodesia, 144.015 format, 8-second key up, 36-second key down, 108 seconds of six call signs, and 280 seconds of key down.

Christchurch, New Zealand: Terry ZL3TAU states that the Christchurch two metre beacon is almost ready to go on the air. The frequency is 145.000 Mc. and will be using a horizontally polarised antenna, omnidirectional and fed with about 20 watts of r.f., keying will be f.s.k. of 800 cycles and the call sign of ZL3VF. (Reprinted from April Spectrum.)

VICTORIA

The March meeting of the V.h.f. Group coincided with the Group's annual general meeting and so much of the evening was devoted to the election of office-bearers for the forthcoming year. The results were as follows: Chairman, Gill VK3ZGS; Vice-Chairman, Neville VK3ZPN, Secretary, Noel VK3ZPQ; QSL Manager, Bill VK3ABP; Treasurer, Derek VK3ZUV; Publicity Officer, Peter VK3ZYO; Equipment Officers, Peter VK3ZAV and Cyril VK3ZCK.

A hearty welcome is extended to both Peter VK3ZYO and Derek VK3ZUV, who are newcomers to the V.h.f. Group Committee. A vote of thanks was extended to the retiring officers for the excellent work they have performed over the past twelve months.

Beacon Group.—Latest news of the group is the planning of completely solid state equipment including the keyer. Construction is well under way and we hope to have them operating on the air well before next summer.

6 Metres.—Activity in the metropolitan area on Sunday mornings (the only chance for a few hours peace on this band owing to the extended hours of operation of our Channel 0) is quite good with many new stations making contacts and the older ones just finding out if their gear still works. Brian VK3ZPU in Ballarat worked through to JA and QSL'ed JA1, JA7 and JA8, a total of eight rare DX stations; also heard working them were VK4s and VK5s.

2 Metres.—Quite a number of newcomers are appearing on the band, while Ron VK3AKC regularly works VK7WF and VK5ZKR. The only other reports of DX are that the VK6 2 mx beacons have been heard on many occasions.

432 Mc.— Activity here is diminishing now that the Ross Hull Contest is over, but regulars appear quite frequently and a number of stations are building gear for this band. Maybe 432 will become more active than 2 metres.

A.T.V.—Brian VK3ZPU has almost completed a 440 Mc. a.t.v. rig and will soon be checking out the path to Geoff VK3AUX's Mt. Dandenong QTH and will be interested to hear from any Amateur interested in a.t.v. 73, Peter VK3ZYO.

Geelong.—Max VK3ZQY, of Geelong, reports that the 2 mx band was really open on Saturday, 8th March, as he managed to work Max VK7MZ, Col VK7LZ, John VK7NZ and Den VK7DK with his MR3A, a ground plane, all from his 16 ft. runabout whilst doing a little bit of fishing! Also from Geelong, there appears to be some strange signals on or about 147.85, the same signals can also be heard on 145.854 Mc.

DX RECORD, 2 METRES, 11,370 MILES

This was an earth-moon-earth QSO on 4th March, 1969, at 1756 GMT. John ZL1AZR worked Kjell SM7BAE of Sweden. Gear used: ZL1AZR—tx p.p. 4/400s (grounded grids and screens), zero bias class B linear and p.o. 550-600 watts. Rx Diglet masthead pre-amp. into converter and 14 Mc. tunable i.f. Antenna, 96 element array made up of eight 6/6 slot fed yagis. SM7BAE—tx, 4CX250, 1500 watts input, rx 2N4416 masthead pre-amp. Antenna, 160 element array of 16 x 10 element yagis. (Reprinted from April Spectrum.) It is hoped that full details of this new record will be available later.

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SOUTH-EAST RADIO GROUP OF SOUTH AUST.

ANNUAL CONVENTION

will be held over the week-end

SAT., SUN., and MON., 14th, 15th and 16th JUNE, '69

V.h.f. events including fox hunts, scrambles, transmitter hunts, plus events for ladies and children.

Hotel and motel accommodation arranged as required. ($2 dep. per person if needed.)

REGISTRATION FEE $3

All correspondence to VK5ZKR, Colin Hutchesson, Yahl, via Mt. Gambier.

Rhodesian Beacon ZE1JZA Back on the Air

AFRICA TO AUSTRALIA POSSIBLE ON TWO METRES

Since January 1968 a South Australian Amateur, VK5TN, has been attempting to analyse long range tropospheric propagation on two metres across the Great Australian Bight. This has been done by comparing the surface weather maps, together with the aerological sounding (temp.-height chart used to check the magnitude of temperature inversions) available from the Bureau of Meteorology, with the signal strength of the two metre beacon at Albany, Western Australia (VK6VF/P, on 144.500 Mc.).

Albany is particularly well situated for the experiments and in 1969, Amateurs in Albany, Adelaide and in the southern part of Australia have been noting the signals from VK6VF/P and VK5VF on about two days per week. On 3rd January, 1969, conditions were the best they had been for 12 months and Mick VK5ZDR contacted Wally VK6WG on two metres, achieving the fourth such VK5-VK6 contact on two metres since it was first accomplished in 1951 by Clem VK5GL and Bob VK6BO.

The advantages of making two metre contacts during long range tropospheric propagation conditions such as existed on 3rd Jan. '69 are that the openings can usually be predicted from the surface weather chart a day or so in advance (propagation via the back edge of cold fronts is not as easy to predict).

This procedure had been first noted by VK5ZDR as early as 1964 and had been recently revived by Brian VK5TN as a prelude to taking advantage of the large "high" that exists most of the time in the Indian Ocean area. Predictions for the Indian Ocean region are made possible by the twice daily weather maps which cover most of the Southern Hemisphere. These maps are available at the Bureaux of Meteorology in each capital city, together with the aerological soundings for places such as capital cities and Carnarvon.

Inspection of the Indian Ocean weather maps since 1st Jan. '68 has shown that tropospheric propagation should be good between Carnarvon and Tananarive, Malagasy Republic (formerly Madagascar) on about ten days in the period January through July and occasionally conditions will improve further south to enable v.h.f. tropospheric propagation between Perth and South Africa (especially in the vicinity of Rhodesia). Propagation as far to the east as South Australia could occasionally occur.

The announcement in the December 1967 issue of Electronics Australia, of the establishment of a Memorial Beacon Station ZE1JZA, together with information about the excellent long range tropospheric propagation in Jan. '68 and the existence of the Southern Hemisphere weather maps being realised, resulted in VK5TN commencing a programme of investigation to see whether the Indian Ocean could be spanned on v.h.f./u.h.f.

This programme of investigation has resulted in communications with the Radio Society of Rhodesia, which revealed that the beacon had been off the air from June 1968 to February 1969. By request from Australia, ZE1JZA has been repaired and put back into operation at its former site, 70 miles from Salisbury, Rhodesia, and the two metre transmission has been beamed to Australia from 1st March, 1969, 24 hours a day. Continuous beacon operation has been promised up to September 1969, as requested, after which time the beacon operation may be concluded if there are no positive results.

Amateur Radio operators situated within, say, 300 miles of the Indian Ocean, near Carnarvon and Perth are particularly requested to monitor the beacon which is identified in f.s.k. for 2½ minutes, followed by unmodulated carrier repeated every seven minutes. The frequency is 144.015 Mc. only (the 432 Mc. beacon is no longer on the air). The power output is 60 watts and the 16 element aerial beamed towards Australia has a gain of 15 db. over a dipole. It is expected that when a large high pressure region on the Indian Ocean extends from Africa to the Australian mainland, that signals received with a 12 db. gain two metre aerial should be available at a level of up to 20 microvolts in Western Australia and somewhat less in South Australia (conditions looked good on 10th and 11th March).

Verification of tropospheric propagation over these long distances (up to 7,000 miles) will provide further evidence to present research being undertaken in various parts of the world in v.h.f. microwave propagation and meteorology. Mr. Brian Tideman, VK5TN, would welcome further enquiries, or African signal reports to 33 Ningana Ave., Kings Park, South Australia, 5034.

Note.—The extensive f.m. broadcasting network of stations in South Africa may prove useful as additional more powerful beacons. These extend every 86 Kc. from Channel 1 on 87.740 Mc. to Channel 234 on 107.642 Mc. (Durban North).

Information about suitable v.h.f. transmissions preferably close to 144 Mc. from Malagasy Republic would be welcomed by VK5TN.

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AWARDS

CHRISTCHURCH AWARD

Beautiful colour award available to all Amateur Radio operators. ZLs to work 25 stations in Christchurch area. VKs to work 10 stations in Christchurch area. Rest of world 5 stations in Christchurch area.

Send list of QSOs, certified by two other Amateurs, to Award Manager, P.O. Box 1733, Christchurch, New Zealand. Cost: New Zealand, 50c. Rest of world, $US1 or equivalent.

TRIESTE AWARD

Issued by Trieste DX Club, I1HL. Basic award, 2 stations in Trieste, seal of Trieste, 2 more stations in Trieste. Cost $US1 or IRCs. Applications to I1HL with s.a.s.a.e.

QUARTER CENTURY AWARD

The Quarter Century Award is issued by the British Amateur Radio Teleprinter Group on the submission of satisfactory proof of two-way r.t.t.y. communication with 25 different countries.

Measuring 10 x 13 in. and printed in red and green, the certificate makes an attractive addition to any Amateur Radio station. Endorsement stickers are available for each additional 25 countries.

Application for the award may be made by the following methods:

(1) Submission of QSL cards for the countries being claimed. These cards are returned to the owner after checking.

(2) Submission of photostat copies or clear photographs of QSL cards. Such photographs should clearly show the call sign of the Amateur making the claim and also establish the fact that the contact was made using r.t.t.y. as a mode of communication. This type of claim must be witnessed and signed as accurate by TWO other licensed Amateurs.

(3) Claims may also be accepted based on a contest log submitted for any contest sponsored by the British Amateur Radio Teleprinter Group. The claim for the QCA Certificate should be made at the same time as the contest log is submitted.

The cost of the certificate is $US1 or 7/6 in International Reply Coupons.

Send your claims to: Ted Double, G8CDW, B.A.R.T.G. Contests and Awards Manager, 33B Windmill Hill, Enfield, Middlesex, England.

DX

Sub-Editor: PETER NESBIT, VK3APN
32 The Grange, East Malvern, Vic., 3145
(All times in GMT)

ASSORTED

Report on the HK0TU DX-pedition. The party arrived at Malpelo Island on schedule and were signing /MM, but were unable to land because of rough seas. Following two unsuccessful attempts, they finally managed to reach shore the next day. While landing, one rig was lost and two operators were injured (HK3RQ and HK3HY) and had to be returned to the boat. A 20 metre dipole was quickly erected and on Sunday the 23rd at 05z the pile-up on 20 mx s.s.b. was terrific. Then followed a marathon c.w. stint from 07 to 13z.

Next morning the rest of the antennas (160 to 10 mx) were set up. The 20 mx beam suffered a bending when a bird crash-dived and bent one of the reflectors. On Sunday, the pile-up was as big as ever. On Monday from 00 to 06z, 14195 s.s.b. was used; however, very few VK/ZL stations answered. Return was scheduled for Wednesday, 26th February. Colombian newspapers gave much publicity to the event and while there the operators received radio messages from the President of Colombia and from Dr. Samaniego, Director of Telecommunications. On the whole, the expedition was an outstanding success and has helped remove Malpelo Island from the list of "Most Wanted Countries".

Heard Island: Bill W7ZFY was using the call VK0WR from the 11th to the 16th of March. Since he lost his beam in 80 m.p.h. winds that swept the island the first day, a dipole was used for the remainder of the operation. He was often working amid a terrific din caused by many stations "keeping the frequency clear". See below for the QSL address.

W4BPD DX-pedition: Gus is reported to be going strong, so far he has operated from ZD3A, 6W/W4BPD, VQ8CCB (St. Brandon), VQ8CCR (Rodriguez), VQ8CP (Mauritius), and others. No transport to Chagos is available at present, so it seems (at this moment) that Chagos is **out**. Frequencies are: c.w.—1827, 3525, 7025, 14025, 21025, 28025. s.s.b.—3795, 7095, 14195, 21245 and 28495. **QSLs**: Special arrangements will be used to distribute VQ8CCR and VQ8CCB QSLs via the bureau within a few days of the operation. **Do not** send your card to anybody; QSLs from stations contacted are not needed. It is hoped this will simplify matters for everyone concerned. If you do not receive QSLs within six months, send details of the QSO to W4ECI (address below).

New Prefixes: It is reported that new prefixes in JA land are JD1 and JR1. 6Y0A is a special call allotted to some lucky 6Y5 station. Tony 5L2AK reports that all EL stations are now allowed to use the prefix 5L.

Hearty congratulations to Stew W1BB for finally reaching his D.X.C.C. on 1.8 Mc. His hundredth D.X.C.C. country was HK0TU. Now he is truly "Mr. 160 metres"! Congrats. Stew.

The PJ7JC who has been knocking around the bands lately is none other than Jose, ex PJ2MI.

In a letter dated Feb. '69, the U.S.C.G. confirms that they have allowed no private individuals to visit Navassa Island since 1963, and this arrangement will continue indefinitely. This sort of sticks the pin in any idea of a DX-pedition to the place.

Ulli 7P8AR is now QRV on five bands, with a TH6DX beam at 75 ft. for 10/15/20; a 2 el. beam on 40; and a half wave vertical on 80. Quite a nice set-up.

As from the middle of March '69 and for a period of 12 months, VK9KY will be operating from Cocos (Keeling) Island. The operator's name is Ken Young, and his address Box 31. As Ken is a new operator, it is requested that the boys treat him gently for a start. It is anticipated that he will be operating around 10-14 and 23-24 GMT on 7050, 14050, 14150, 21050 and 21350. The QSL manager will be Syd VK2SG. S.a.s.e. is requested for QSL replies.

QSL MANAGERS

A2CAH Box 17, Gaberones, Botswana.
AP5CF Tiger A.R.C., C/o. Dacca Signals, Dacca 6, East Pakistan.
CR6BX Box 2163, Luanda, Angola.
CR6GO Box 10408, Luanda, Angola.
SV0WE—C/o. American Embassy, V.O.A.R., A.P.O. New York 09223, U.S.A.
UO5AA—Kagul Radio Club, Kagul, S.S.R., Moldavia.
VK9KY—C/o. VK2SG, S. Molen, 13 Pendle Way, Pendle Hill, N.S.W., 2145.
VK0WR—**All QSLs to** Lt. W. Rohrer, U.S.C.G.C. South Wind, F.P.O. New York 09501, U.S.A.
W4ECI—W.R.P.S.A., 3101 Fourth Avenue South, Birmingham, Alabama 35233, U.S.A.
YB0AC—Box 1056, Djakarta, Indonesia.
3V8AC—Box 323, Tunis.
5R8BP—Box 437, Madagascar.
5W1AD—D. Swift, Box 63, Apia, Western Samoa.
7P8AR—Box 194, Maseru, Lesotho.
7P8YL—As for 7P8AR.

AP2AR—W8QWI.
CR9AK—CT1BH.
EA6BG—DL7FT.
EA6BH—DL7FT.
FG7TG—W5BUK.
FM7WO—WB2SSK.
FY7YR—VE3BYN.
HS3DR—VE3DLC.
HS3RB—DL7FT.
KC6BW—WA3HUP.
KC6BY—WB9ALM.
KC6JC—W2RDD.
KL7EBK—DL7FT.
KR6JT—DL7FT.
KW6EJ—W2CTN.
MP4TAF—DL6AA.
OA4DX—W4TKN.
PJ7JC—VE3EUU.
PJ8AA—W2BBK.
PJ8AB—K7TMK.
SV0WN—K3EUR.
TA2EA—W9JXD.
VP6LS—VE3DLC.
VR2DK—W2CTN.
W7UAF/KH6 DL7FT.
XE2YP—DL7FT.
YA1KO—W7WDM.
ZA0II—I1KTJ.
ZS1ANT—ZS6N.
3A2CN—DL7FT.
3A0CU—DL7FT.
3V8BZ—DL7FT.
5L2J—WB2WOU.
5R8CJ—WA0RZB.
5W1AS—WB6KBK.
8P6AU—WB2FCI.

ACTIVITIES

Welcome to Jack VK3AXQ, a new contributor to the column. He is fairly new to the game and works when time permits, and is limited to 20 mx c.w. at the moment. He says:

"An unusual one—worked WA6MUT/MM on board S.S. Japan Bear (?), N.W. of Hong Kong; S6 both ways but bad QRM. Heard VK6OV working Ernst DL1ND, both nattering away at length in German—good for practice! A lone KM6DQ called CQ and raised a hornet's nest of stations replying, and not assisted by a UA who decided to hold his key down."

Jack says that VKs are noticeable by their absence around 08-10z. (Thanks Jack, please send more.—Peter.)

Reg VK4VX, a regular contributor, sent in a rundown on his activities, comprising a page full of recent QSOs. Once again they were all 20 mx c.w. 100w. to a 3-el. beam at 66 ft. produced the following: 8R1J, VK0WR, UM-8KAA, OY2H, PY0EP, HK0TU, and EA6BH. Many others were listed, this being only a taste of the DX available. (Thanks Reg.—Peter.)

Fred VK4RF is another who has been bitten by the c.w. bug. Says he got a sudden urge for the key the other night, so hooked in a jack on the rig, dusted off the old Simplex-Auto, and then ploughed through scores of DX. In one week-end 77 stations were contacted, the majority of them Europeans worked via long path in two sessions. **That** is really travelling, considering that Fred hadn't had a c.w. QSO for 19 years! (Good on you, Fred, nice work.—Peter.)

RULES FOR THE WAZ AWARD
(Worked All Zones)

The object is to work each of the 40 zones in the world. The following rules apply: The official "CQ" WAZ Zone map will be used in determining zone boundaries. Confirmations must be accompanied by a list of claimed zones showing the call of the station worked and the mode. All contacts must be made with licensed, land based, Amateur stations. All contacts submitted must have been made within 250 miles of the original location. Altered or forged confirmations will result in permanent disqualification of the applicant.

Endorsements are available for s.s.b., a.m., or c.w. operation. Include with the application U.S. $1 or eight I.R.C's to defray the cost of the certificate. All applications must be sent to: The DX Editor, P.O. Box 205, Winter Haven, Florida 33881, U.S.A. Zone maps and/or WAZ applications are available from the above address on receipt of a self addressed envelope and one I.R.C.

This is a worthwhile award as it takes considerable skill to work all of the 40 zones. So good luck!

SUMMARY

The reduction in sunspot numbers has begun to take effect. This year the higher bands (10 and 15) have been very unpredictable—sometimes excellent, often very poor. Conversely, the lower bands have definitely improved with better long path openings on 40, and some excellent openings to Europe and the U.S.A. on 80. 20 seems much the same.

Thanks to those contributors who have helped out with news this month: DX News, LIDXA, ZL2AFZ, VK3AXP, VK3AUT, VK4RF, VK4VX and VK2SG.

73 and good DX, Peter.

HAMADS

Minimum $1 for forty words.
Extra words, 3 cents each.

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE.

Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at **P.O. 36, East Melbourne, Vic., 3002,** by **5th of the month** and **remittance must accompany** the advertisement.

ANY OFFERS? Electronics 1962 S.s.b. Tx uncompleted. Most parts including spare 813, power supply and circuit. VK2ME, D. Sidey, Dog Trap Road, Yass, N.S.W., 2582.

BENDIX Frequency Meters: BC221 with in-built AC/DC power supply. In original sealed cartons and complete with charts, manual, headphones, cords and spare valves. Limited quantity. $70 cash with order. Advise shipping instructions. G. B. Lance, 123 Webster St., Ballarat, Vic., 3350.

FOR SALE: Galaxy V. Transceiver, Galaxy Remote VFO, solid state power supply, $485 the lot. Clean condition and not over used. With instruction manuals. Phone 874-5632 or write, VK3UJ, 6 Barton Crt., Vermont, Vic., 3133.

FOR SALE: Geloso 222 A.M. Transmitter, in first class condition. $90 o.n.o. G. A. Van der Harst, VK5XV, 21 Dudley Cres., Marino, S.A., 5049. Phone 96-3136.

FOR SALE: Heathkit Amateur Band Receiver, Model HR-10, 240 volt a.c. operation, factory assembled, $80 or nearest offer. B. Ritchie, 1347 Gregory St., Wendouree, Vic., 3355.

FOR SALE: Heathkit SB-100. Excellent cond., with pwr. sup., mike, manual. Best cash offer over $430. Inspection welcomed. Also Kyoritsu S.W.R. Meter, as new, $15. 4-BTV multiband vertical (10 through 40), $42.50. University Graham sig. gen., 150 Kc. to 30 Mc., offers? Brinkley, 9 Faunce Cres., O'Connor, Canberra, A.C.T.

FOR SALE: Heath SB-301E Receiver, SB-401E Transmitter, SB-600 Speaker Box, 240v. operation, new Sept. 1968, excellent performers, $625. Sony Tape Deck TC-250, solid state, stereo, four track, two speed, 7 inch spools, as new, $115. L. A. Wade, 24 Ramsay Ave., West Pymble, N.S.W., 2073. Phone 449-3538.

SWAN 350, five bands, Transceiver, $400. Vox unit to plug in, $20. Home-brew heavy duty a.c. power supply and speaker, $25. Spare a.c. supply, $20. Heavy duty d.c. (12v.) power supply (4 x 2N458), fused and relay operated, $70. Helical Whips for 80, 40 and 20 with base balun, boot mounting, $30. Will accept $500 the lot. Can be seen working. R. E. Pope, 21 Hillcrest Ave., Kew, Vic., 3101. Phone 80-4279.

WANTED: Any information on AR8 Receiver, 3BZ Transmitter including modifications, also any parts. Particulars and prices, all replies acknowledged. E. Reynolds, 111 Northcliffe Dr., Lake Heights, N.S.W., 2502.

WANTED. AR7 Coil Boxes or parts, any condition. Godfrey, 64 O'Grady St., Albert Park, Vic., 3206. Phone 69-4989.

WANTED: Bendix Azimuth Indicator MN-40D or MN-22A with correct Selsyns. Must be unmodified and in excellent condition. Phone 86-5321 Ext. 388 (business), 878-4939 (private). P.O. Box 69, Kew, Vic., 3101.

WANTED: Frequency Meter BC221 or similar, with Calibration Book and Handbook if possible. Condition, particulars and price to J. N. Thornton, C/o. Telephone Exchange, Pialba, Qld., 4655.

WANTED, the following: Crystal Calibrator No. 10, original condition. Crystals 100 Kc., 455 Kc., 500 Kc. Circuit of R.C.A. Transmitter Type ET4336-H. VK2BEC, 265 Bent St., South Grafton, N.S.W., 2641.

WANTED: Type A Mark 3 Transceiver in working condition and complete with accessories, if possible. Please advise price to R. J. Flynn, VK2AY, 624 Jones St., Albury, N.S.W., 2640.

WANTED, YOUNG MAN

WITH SOUND KNOWLEDGE OF ELECTRONICS

especially Power Oscillators, required for maintenance work and adjustment of machines used for high frequency dielectric heating.

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If you are not receiving your copy of "A.R." please follow these steps which will ensure the correct procedure is followed; any attempt to short circuit the system will only further delay matters.

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★ LIGHT ★ STRONG ★ NON-CORROSIVE

STOCKS NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL DIAMETERS—$\frac{1}{4}$" TO 3"

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Send remittance to Federal Executive, C/o. P.O. Box 36, East Melbourne, Vic., 3002.

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FOR ACCURACY, STABILITY, ACTIVITY AND OUTPUT

Our Crystals cover all types and frequencies in common use and include overtone, plated and vacuum mounted. Holders include the following: DC11, FT243, HC-6U, CRA, B7G, Octal, HC-18U.

THE FOLLOWING FISHING-BOAT FREQUENCIES ARE AVAILABLE IN FT243 HOLDERS:

6280, 4095, 4535, 2760, 2524 Kc.

5,500 Kc. T.V. Sweep Generator Crystals, $7.25; 100 Kc. and 1000 Kc. Frequency Standard, $17; plus Sales Tax.

Immediate delivery on all above types.

AUDIO AND ULTRASONIC CRYSTALS—Prices on application.

455 Kc. Filter Crystals, vacuum mounted, $13 each plus Sales Tax.

ALSO AMATEUR TYPE CRYSTALS — 3.5 Mc. AND 7 Mc. BAND.

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CRYSTALS FOR TAXI AND BUSH FIRE SETS ALSO AVAILABLE.

We would be happy to advise and quote you.

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With the co-operation of our overseas associates our crystal manufacturing methods are the latest.

SUFFERING WITH T.V.I. PROBLEMS?

Well don't! The CABENA LOW-PASS FILTER will ensure your transmitter will not radiate those dangerous harmonics which cause a large percentage of this interference.

The CABENA LOW-PASS FILTER comes completely sealed and fitted with standard UHF Type SO-239 Co-axial Sockets. Its "cut-off" frequency is 30 Mc. with an attenuation at 60 Mc. is better than 30 db. The insertion loss is negligible and it is designed to match 50-72 ohm transmission lines.

PRICE (inc. Sales Tax) **$11.75**

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HOW'S YOUR S.W.R.?

When a transmission line is terminated by a resistance equal in value to its characteristic impedance, there is no reflection and the line carries a pure travelling wave. When the line is not correctly terminated, the voltage-to-current ratio is not the same for the load as for the line and the power fed along the line cannot all be absorbed —some of it is reflected in the form of a second travelling wave, which must return along the line. These two waves, "forward" and "reflected", interact all along the line to set up a standing wave.

The maximum transfer of energy from your transmitter takes place when your transmission line properly matches your antenna. This means efficient operation of your equipment and better signals.

Do you know whether you are matching your system for the best efficiency? If not, you should know, and the simplest method is to use an S.W.R. Meter connected in your transmission line at all times.

For a modest outlay we can supply you KYORITSU Model K-109 S.W.R. METER so that you can check your transmission line instantly and at any frequency from 1.5 to 60 Mc. What's more, unlike other makes, you don't have to have two separate S.W.R. Meters for 52 ohm and 75 ohm (nominal) transmission lines. **The K-109 S.W.R. Meter is switchable from one impedance to the other!**

KYORITSU MODEL K-109 S.W.R. METER

PRICE **$19.50** (S.T. & postage paid)

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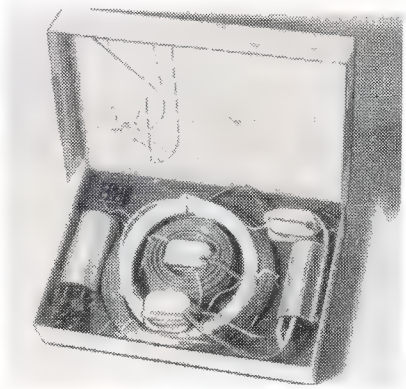

AF1 Noise reducing Aerial Kit

For use in noisy locations for clearer reception. Designed to cover both M/W and S/W broadcast bands (from 500 to 1500 Kc. and 2 to 15 Mc., approximately).

Available in all States.

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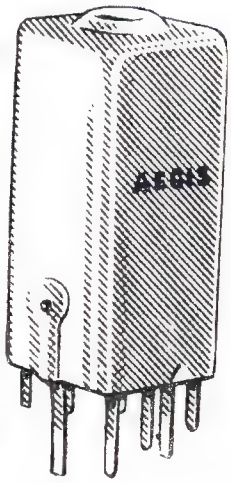

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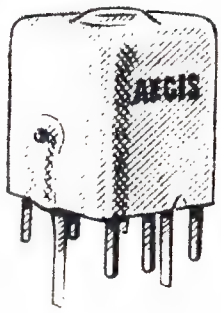

Available from any good radio parts distributor.

Write for technical details and prices.

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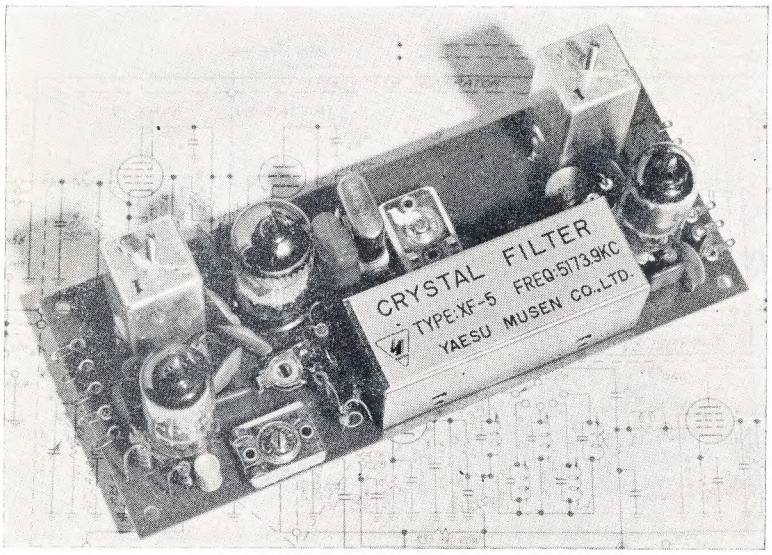
Phones: 49-1017, 49-6792

Yaesu TYPE F S.S.B. GENERATOR



FOR HOME-BREW CONSTRUCTOR

Here is a pre-aligned crystal filter s.s.b. assembly to form the basis of an s.s.b. transmitter. It provides 1.5 volts r.m.s. u.s.b. output ready for heterodyning to h.f. or v.h.f. bands. For 80 and 40m. l.s.b. is obtained by proper choice of heterodyning frequencies. Makes it easier, doesn't it?

The Yaesu Type F s.s.b. generator (as used in the FL-50 transmitter) consists of a printed board 6½" x 2¼", completely assembled with valves, five crystal lattice filter, 5172.4 Kc. carrier crystal, 6BA6 mic. amp., 12AT7 carrier osc. and audio cathode follower, diode balanced modulator, 6BA6 i.f. amp. Circuit supplied; also circuit of a complete s.s.b. transmitter incorporating the generator.

PRICE $49.50 incl. S.T. Postage extra. (shipping weight 1½ lb.)

Full range of other Yaesu equipment, Transmitters, Receivers, Transceivers, Linear Amp., matching speakers, valves and spares.

Warranty and after-sales service.

Obtainable from Australian Agents: **BAIL ELECTRONIC SERVICES**
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Authorised Rep. in N.S.W.:
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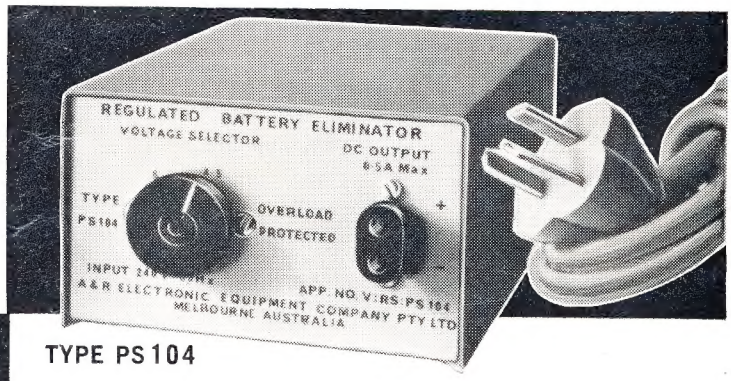
BATTERY ELIMINATOR
REGULATED
POWER SUPPLY

Specially for Larger Battery Operated Tape Recorders.



TYPE PS104

SPECIFICATIONS

Input Voltage	240 Volts. 50 Hz.
Output Voltage	4.5V 6V, 7.5V 9V or 12V D.C. by Selector plug. Max. Current 0.5A.
Protection	Electronic Overload Protection.
Regulation	Approx. 10% on 12V Range Approx. 5% on all other Ranges
Ripple	Less than 100 mV R.M.S. under all conditions.
Circuitry	All silicon solid state.
Size	4 ins. wide by 2⅝ ins. high x 5½ ins. deep
Weight	2 lbs. 7 ozs.
Approval	Approved by Electric Supply Authorities

Designed primarily for Tape Recorders where a regulated voltage supply is necessary to prevent speed variation with load changes. A versatile power supply with a range of output voltages making it ideal for design testing and repair of Transistor Radios, Amplifiers, Record Players, Test Equipments, etc. It is also eminently suitable for use in Schools, Universities, Government Departments and Industry.

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W.A. EVERETT AGENCY P/L., 17 Northwood St., West Leederville Phone 8 4137

Changes for Mobile Radiotelephone Services

Licensees of V.H.F. land and harbour mobile radiotelephone services, now operating in 30 kc/s channelling areas, are advised that if they have not already installed equipment which meets the Australian Post Office 30 kc/s channelling specification, they must do so before 30 June, 1969.

This requirement has been brought about by the growing demand for V.H.F. mobile radiotelephone services in city areas which is taxing the existing channels available. The change to 30 kc/s channelling will enable more radiotelephone services to be brought into operation as they are required.

However, some changes to existing equipment will be necessary and the following programme for conversion, which is designed to cause the least inconvenience to all concerned, has been adopted:—

As from 30 June, 1969, licensees of V.H.F. mobile radiotelephone services operating in 30 kc/s channelling areas within the frequency bands 70-85 Mc/s and 156-174 Mc/s* will be required to make necessary changes so that:—

(i) All base station transmitter/receivers (both amplitude and angle modulated) employed in a base station installation shall be of a type complying with the relative Post Office specification and approved for 30 kc/s operation and shall be operated in accordance with the terms of that specification.

(ii) All angle modulated mobile transmitters shall be adjusted to function with a maximum deviation of ±5 kc/s.

*This excludes the International Maritime Mobile V.H.F. Radiotelephone and the existing Australian Post Office Subscriber Services.

Early conversion will assist manufacturers in meeting delivery dates for equipment.

FURTHER DETAILS MAY BE OBTAINED FROM THE SUPERINTENDENT, RADIO BRANCH, G.P.O., IN YOUR CAPITAL CITY.

AUSTRALIAN POST OFFICE

PRT3.84.39

TRIO TR2E 2 METRE TRANSCEIVER

- Triple conversion receiver with crystal locked 2nd and 3rd oscillators for maximum selectivity and sensitivity.
- Separate VFO tuning for both receiver and transmitter.
- Nuvistor RF amplifier.
- Provision for crystal locking of the transmitter.
- 12 volts DC (internal transistor power supply) and 230/240 volts AC operation.
- Noise limiter and squelch.
- 17 tubes, 4 transistors and 7 diodes.
- 1 microvolt sensitivity for 10 db. S/N ratio at 146 Mc.
- :"S" meter, RF output meter, and "netting" control.

Price: $282.00

MILLER 8903B PRE-WIRED I.F. STRIPS

455 Kc. centre frequency, 55 db. gain, uses two PNP transistors and diode detector. Bandwidth 5 Kc. at 6 db. DC requirements: 6 volts at 2 mA.

Price: $9.70

Plus pack and post 25 cents

VALVE SPECIALS

ATS25 ceramic base 807, **70c** or **three for $2.**
815, **70c.**
6AC7, **20c** or **12 for $2.**
6J6, **30c** or **7 for $2.**
6CQ6, **20c** or **6 for $1.**
VR150/30, **75c** or **3 for $2.**
QB2/250 (813), new and boxed, **$7 ea.**
6H6 metal, **20c** each.
DM71 indicator tube, **40c ea.** or **6 for $2.**
6F33, **30c** ea.

RESISTORS

Mixed Values
$2 per 100
plus postage 20 cents

CAPACITORS

Mixed Values
80 for $2
plus postage 20 cents

STAR ST-700 TRANSMITTER

SSB — AM — CW
80 Metres to 10 Metres

- Ultra-precision three-stage double gear tuning mechanism, completely free of backlash, spreads each 600 Kc. over 1.68 metres with 1 Kc. dial calibrations.
- Stability better than 100 cycles. "Vackar" type VFO. Voltage regulated power supply.
- Uses mechanical filter at 455 Kc. specially designed for SSB. Selectable upper or lower sideband. Carrier and sideband suppression 50 db. or more.
- May be connected with STAR SR-700A receiver for transceive operation.
- Fully adjustable VOX and ANTITRIP circuits for automatic transmission/reception.
- Press-to-talk relay, break-in keying and sidetone oscillator for CW monitoring.
- Automatic level control circuit assures high quality distortion free SSB.
- Built-in antenna relay.
- Final stage uses two 6146s in parallel with conservatively rated input of 250 watts PEP on SSB and CW, 100 watts on AM.
- Built-in heavy duty power supply with adequate reserve margin assures trouble-free operation.
- Power supply 220 to 240 volts AC 50 cycles.

Price: $519.50

CARBON POTS

20 cents ea.

WIRE-WOUND POTS

40 cents ea.

3000 TYPE RELAYS

large range
Only 50 cents ea.

VACUUM SEALED RELAYS

mainly 24 volts
50 cents ea.

TRANSISTORISED COMPUTER BOARDS

from **$3**

FULL RANGE OF MULTIMETERS

STAR SR-700A RECEIVER

SSB — AM — CW

- Ultra-precision three-stage double gear tuning mechanism, completely free of backlash, spreads each 600 Kc. over 1.68 metres with 1 Kc. dial calibration.
- Stability better than 100 cycles. "Vackar" type VFO. Voltage regulated power supply.
- Triple conversion. IF's 1650 Kc. and 55 Kc. First and third oscillators crystal controlled.
- Imagine ratio better than 60 db. on all bands. Beat interference below noise level.
- Variable selectivity band pass filter at 55 Kc. provides steep cut offs and a good shape factor. Four positions: 0.5, 1.2, 2.5 and 4 Kc. (at 6 db. down).
- T-notch filter provides better than 50 db. attenuation.
- Variable decay AGC. Variable BFO tuning.
- Output terminal on VFO for transceive operation.
- Product detector for SSB/CW. Diode detector for AM.
- Noise limiter with adjustable clipping level operates on AM, SSB and CW.
- Built-in 100 Kc. crystal calibrator (crystal included). Zero adjustment on VFO.
- Sensitivity better than 0.5 uV. for 10 db. S + N ratio on SSB and CW, better than 1 uV. on AM.
- Power output, 1 watt. Impedance, 4 ohms.
- 13 tubes, 6 diodes.

Price: $461.50

MARCONI TF885A VIDEO OSCILLATOR

Price: $120

SANSEI SE405 S.W.R. BRIDGE

1 Mc. to 150 Mc., also doubles as a Field Strength Meter
Price: $21 inc. tax

WE SPECIALISE IN CRO's

Cossor, Solarton, Dumont, A.W.A., Philips, E.M.I.
From $80

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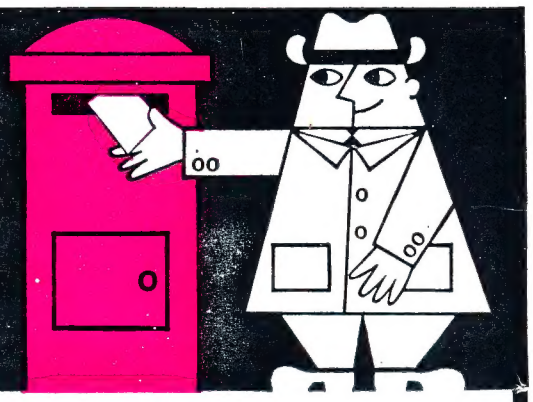
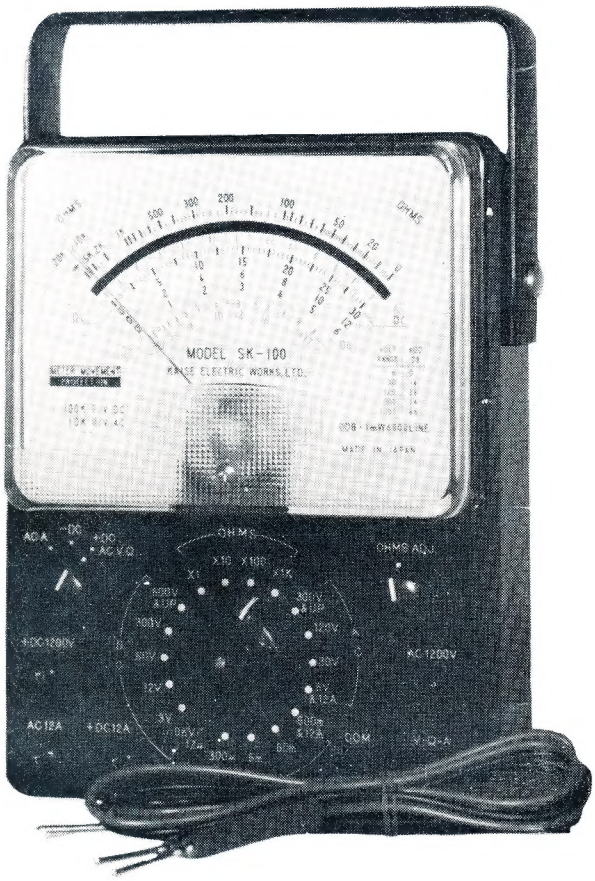


BIG! NEW! . . . 'RAPAR' MULTI-TESTER



MODEL SK-100

- ★ 23 RANGES.
- ★ 100K O.P.V. ON D.C. 10K O.P.V. ON A.C.
- ★ OVERLOAD PROTECTION.
- ★ MIRROR SCALE.

Ranges:

D.C. Volts: 0-0.6, 3, 12, 60, 300, 1,200.

A.C. Volts: 0-6, 30, 120, 300, 1,200.

D.C. Current: 0-12 uA., 300 uA., 6 mA., 600 mA., and 12 A.

A.C. Current: 0-12 A.

Ohms: 0-20 megohms in four ranges.

Centre Scale Reading: 150, 1.5K 15K, and 150K ohms.

DB.: —20 to +17. 0 db. = 1 mW. in 600 ohm line.

Weight: 2 ½lb. Size: 7" h. x 5½" w. x 2½" d.

TRADE PRICE:

$38 + **15% Sales Tax** where applicable

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